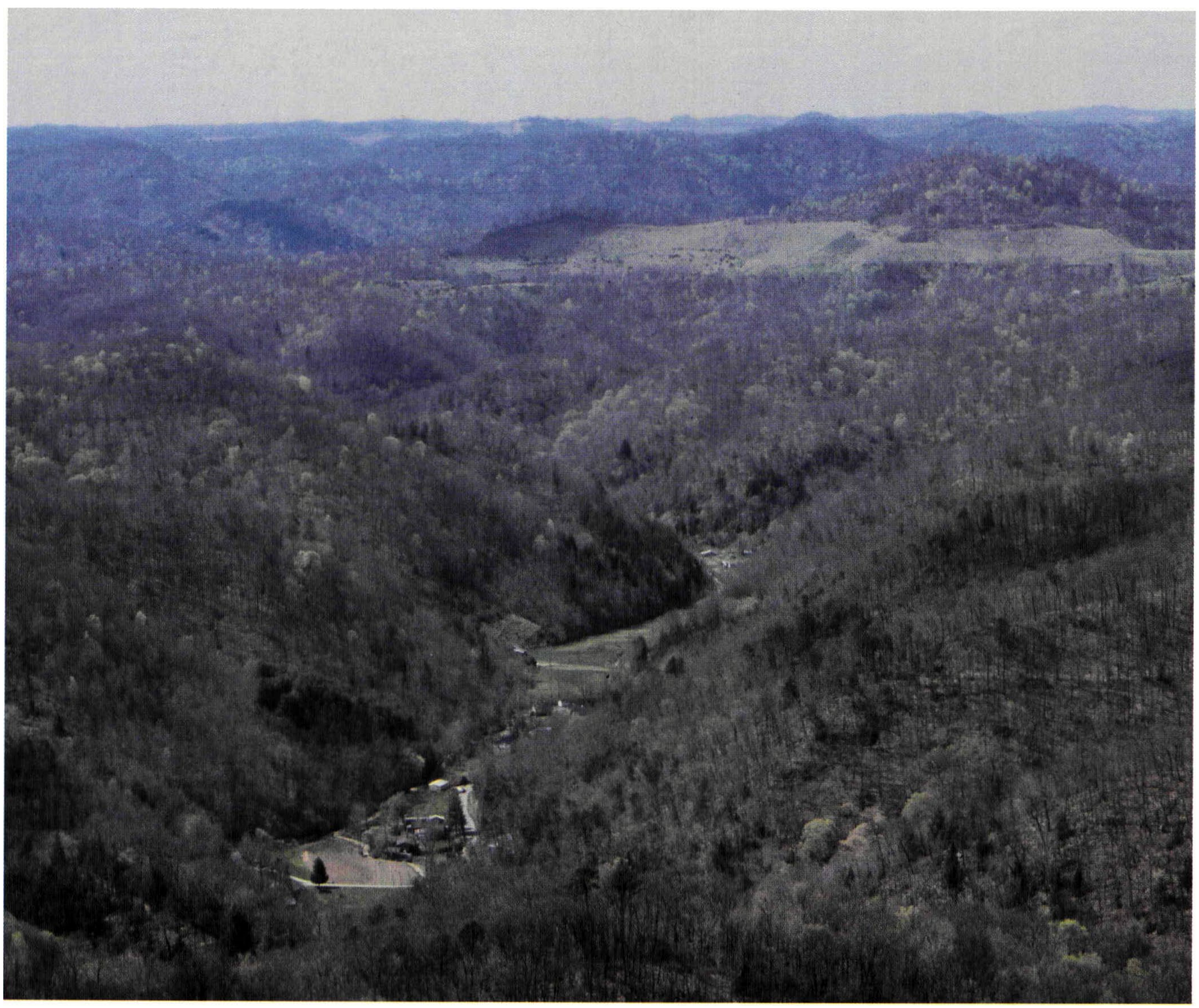
United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Kentucky Natural Resources and Environmental Protection Cabinet; Kentucky Agricultural Experiment Station; and United States Department of Agriculture, Forest Service

Soil Survey of Knott and Letcher Counties, Kentucky



How To Use This Soil Survey

General Soil Maps

The general soil maps, which are in color, show the survey area divided into groups of associated soils called general soil map units. These maps are useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the applicable map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

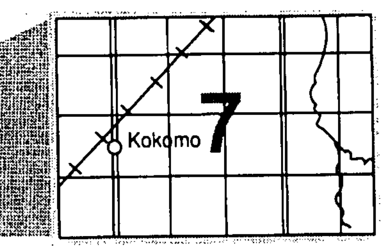
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



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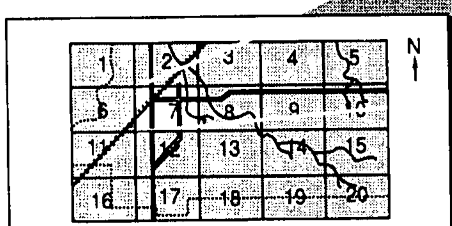
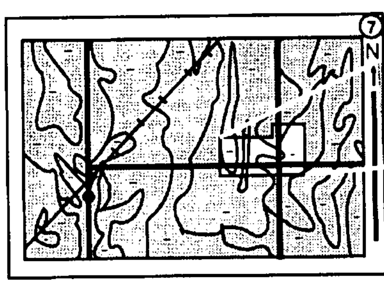


INDEX TO MAP SHEETS



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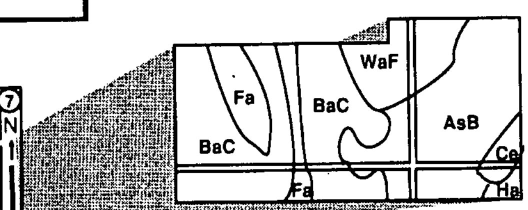

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1996. Soil names and descriptions were approved in 1996. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This survey was made cooperatively by the Natural Resources Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, the Kentucky Agricultural Experiment Station, and the United States Department of Agriculture, Forest Service. The survey is part of the technical assistance furnished to the Knott County Conservation District and the Letcher County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Little Cowen Creek in Letcher County as seen from the slopes of Pine Mountain. The soils in this area are in the Shelocta-Highsplint-Cloverlick-Kimper general soil map unit.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.

Contents

Issued 2004

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil maps. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

David G. Sawyer
State Conservationist
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Soil Survey of
Knott and Letcher Counties, Kentucky

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United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Kentucky Natural Resources and Environmental Protection Cabinet, Kentucky Agricultural Experiment Station, and United States Department of Agriculture, Forest Service

Knott and Letcher Counties are located in the eastern part of Kentucky (fig. 1). They are in the Eastern Kentucky Coalfields Physiographic Region (University of Kentucky and USDA 1970). Knott County has a land area of about 353 square miles, or 225,224 acres, and 767 acres of water. Letcher County has a land area of about 339 square miles, or 216,884 acres, and 108 acres of water. About 800 acres in Letcher County is included with the Jefferson National Forest. Knott County is bounded to the northwest by Breathitt County, to the north by Magoffin County, to the northeast by Floyd County, to the east by Pike County, and to the southwest by Perry County. Letcher County is bounded to the southwest by Harlan County, to the northwest by Perry County, to the northeast by Pike County, and to the south by Wise County, Virginia. Hindman is the county seat of Knott County, and Whitesburg is the county seat of Letcher County. In 1990, the population of Knott County was about 18,000 and that of Letcher County was about 27,000 (U.S. Department of Commerce 1991).

The urban areas and farms of these counties are on flood plains, stream terraces, and ridgetops. The remaining area consists of secondary growth woodland, surface mines, a few limestone quarries, and coal dumps. The landscape is characterized by long, narrow ridgetops, steep hillsides, and narrow valleys. In addition, a long river valley surrounded by linear mountains is near the Virginia border. Most of the soils formed in colluvium, residuum, or alluvium derived from sandstone, siltstone, or shale of the Pennsylvanian System, with the exception of the northwestern scarp face of Pine Mountain in Letcher County, which is composed of shale, limestone, and siltstone of the Mississippian and Devonian Systems.

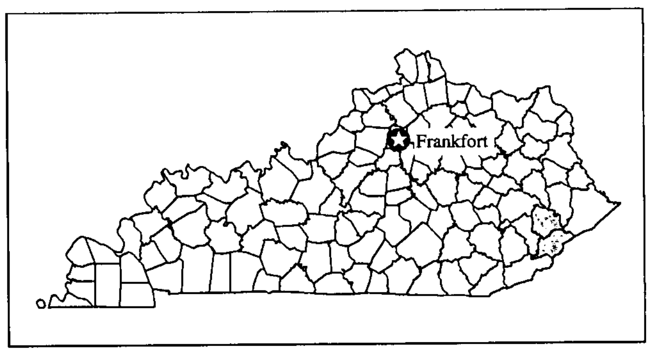

Figure 1.—Location of Knott and Letcher Counties in Kentucky.

This soil survey supersedes the soil information for Knott and Letcher Counties in the "Reconnaissance Soil Survey of Fourteen Counties in Eastern Kentucky" (McDonald and Blevins 1965). It also provides updated soil series names and descriptions, larger maps that show the soils in greater detail, and additional information.

General Nature of the Survey Area

This section gives general information concerning Knott and Letcher Counties. It discusses history and development, farming, natural resources, topography and drainage, and climate.

History and Development

Native peoples used the Big Sandy, Kentucky, and Cumberland River valleys for homes, trade routes, and hunting grounds for thousands of years before European settlers came to the present area known as Kentucky, at least as far back as the last ice age, 10,000 years ago. The Paleo-Indian period (10,000-7,000 B.C.) was a time of habitation in small camps that were frequently moved from one location to another. Many of the stone tools found in Kentucky date from this period. During the archaic period (7,000-10,000 B.C.), environmental conditions improved and habitation was established for extended periods in base camps along major streams and rivers. The woodland period (1,000 B.C-A.D. 1,000) saw the introduction of new technology such as the growing of maize, basket weaving, improved pottery techniques, and regionalization of culture and language. Finally, the late prehistoric period (A.D. 1,000-1,700) brought about the "fort ancient" cultures and the appearance of stockaded villages built around a central plaza (Railey 1989).

A trail known to settlers as the "warrior trail" ran from Cumberland Gap in Bell County through sections of Knott and Letcher Counties to Paintsville in Johnson County, linking the Big Sandy, Licking, Kentucky, and Cumberland River valleys. Most of the native peoples encountered by early Kentucky explorers occupied towns and villages along the Ohio River, such as Shawneetown in Greenup County. Disease and warfare had already reduced the native population along the smaller waterways. Native people objected to permanent settlement in Kentucky because the woodland areas provided excellent hunting, sources of flint, and trade routes from north and south.

Christopher Gist is thought by historians to have been the first European to visit, in 1751, what are now Knott and Letcher Counties. Gist was an employee of the Ohio Company, a land agency whose headquarters were in Cumberland, Maryland. Leading a small party of companions, Gist traveled down the Ohio River by flatboat to the mouth of the Kentucky River at Port Royal, Kentucky. From there, he traveled back upstream to the headwaters of the Kentucky River near Payne Gap, not far from present-day Jenkins. Dr. Thomas Walker and his party also passed through the Cumberland Gap and traveled to the Licking River at present-day Salyersville in Magoffin County, probably by way of Knott and Letcher Counties (Bowles 1949.)

Pound Gap on Pine Mountain, along the eastern border with Virginia, placed Letcher County on a pioneer trail into the state. However, most settlers only passed through the area seeking farmland elsewhere. Between 1810 and 1840, the population grew rapidly. In 1842, Letcher County was established as Kentucky's 95th county from parts of Perry and Harlan Counties. Letcher County was named for Robert P. Letcher, Governor of Kentucky at that time.

During the Civil War, both Union and Confederate troops marched through the new county and Union troops held Pound Gap for much of the war. On March 16, 1862, Brigadier General, and later President, James A. Garfield defeated a Confederate force under General Humphrey Marshall occupying Pound Gap. In 1863, Confederate raider John Hunt Morgan temporarily dislodged the Union force left to guard the gap.

Knott County was settled after the Civil War as the population increased, and farmers and loggers moved farther upstream into the watersheds of Jones Fork, Rock Fork, Carr Creek, Quicksand Creek, Troublesome Creek, and Beaver Creek. Robert Bates, T.Y. Fitzpatrick, and Fielding Johnson were primarily responsible for the establishment of Knott County. The popular argument for forming the new county was the great distance from the county seats of the counties which Knott County would be carved from—Breathitt, Floyd, Letcher, and Perry Counties. Robert Bates was elected to the State legislature and introduced the bill to form Knott County, which was duly named for J. Proctor Knott, Governor of Kentucky at that time. Hindman, the county seat, was named for James Hindman, who was Lieutenant Governor. The county seat had formerly been known as McPherson, or simply "The Forks of Troublesome."

In 1885, coal speculation by large corporations began in parts of Knott County and in most of Letcher County. A great deal of the mineral wealth was deeded to coal companies that established the towns of Jenkins, Fleming, McRoberts, and Seco. Eastern European immigrants and African-Americans from the

deep South were recruited to work the mines and build a railroad, which reached the town of McRoberts by 1912. Some of the newcomers were Italian artisans, who constructed fine stone bridges and houses. A period of prosperity and growth followed. On May 27, 1927, however, the first of many great floods swept the area and a period of decline began, which was further accelerated by the Great Depression (Cornett 1967).

During and after World War II, industrial demand for coal stimulated mining. Mechanization of the mines, however, soon put many of the miners out of work, and outmigration to northern cities began. Between 1940 and 1960, the population declined by 17,000 people. Because of the decline in the production of coal, the coal companies sold their towns by the 1960's.

Farming

Subsistence agriculture was once an important part of the economy of Knott and Letcher Counties. By 1991, however, the number of producing farms had decreased to 36 in Letcher County and 29 in Knott County.

The principle crops in Knott and Letcher Counties are corn and hay. Raising cattle, calves, hogs, pigs, and a small, but growing, number of goats are the main livestock operations in the area. In 1993, total cash receipts reported from farming totaled 291,000 dollars in Knott County and 521,000 dollars in Letcher County (Kentucky Department of Agriculture and USDA 1994).

Most of the original forest was cleared during the last century on both the narrow flood plains and steep hillsides, almost to the ridgetops, by cutting the marketable or useable timber and burning the rest. The land was then "grubbed out" for growing corn with limited applications of fertilizer. Once yields declined due to erosion and continuous cropping, the land was converted to pasture. These practices are thought to have been responsible for much flooding and rapid deposition of sediment in the Kentucky River. Fine fragments of charcoal are commonly found in the young soils near the river today. They probably came from the burning of the original hardwood forest. Because subsistence farming has declined in importance and a cash economy has become established, most of these hillside areas are reforested and only the flood plains and stream terraces remain cleared. Around Whitesburg and some of the major communities along the Kentucky River, flood plain soils have been taken out of crop production by converting the soil areas to urban uses. This has been achieved by filling with unconsolidated rock and soil materials to raise areas to an elevation above the flood plain.

Natural Resources

The major natural resources in the survey area are soil, water, timber, coal, oil, gas, and limestone. Supplies of surface water, which are adequate to meet present needs, are available from lakes and rivers (fig. 2). Ground water is adequate to satisfy the needs of most rural homes.

Numerous bituminous coal seams ranging from a few inches to several feet thick occur in the sedimentary rocks of the Pennsylvanian System. Coal has been commercially mined in the area since the late 19th century. Currently, most coal seams being mined are used for electric power generation. The seams range from 2 to about 5 feet thick. Underground, auger, and surface mining are used (fig. 3). In 1996, about 8.5 million tons of coal were mined in Knott County and about 8.3 million tons in Letcher County. Of the total tonnage mined in each county, about 55 percent was from underground mines in Knott County and 68 percent was from underground mines in Letcher County (Kentucky Department of Mines and Minerals 1996).

Oil and gas deposits are found mainly in the pre-Pennsylvanian rocks beneath the coal fields, and several oil and gas fields are producing in the survey area. Limestone is quarried for road construction, concrete aggregate, and agricultural lime from exposures along Pine Mountain in Letcher County.

Soil scientists have determined that there are about 32 major kinds of soils in Knott and Letcher Counties. The soils range widely in texture, natural drainage, and other characteristics. Most of the steep mountains are mantled by moderately deep, deep, and very deep soils that contain varying amounts of rock fragments. The soils on the stream flood plains and terraces are dominantly loamy. The soils in the upper reaches are dominantly gravelly. Generally, the topsoil is dark and ranges from a few inches to as much as 12 inches or more in thickness. In most of the survey area, the subsoil is pale and acid. However, on the northwestern face of Pine Mountain in Letcher County, limestone rock outcropping occurs and reaction ranges from moderately acid to neutral. On flood plains bordering streams, soil material accumulates as a result of periodic flooding. Natural levees form where coarse sediment settles from floodwaters. Finer textured sediment is carried farther toward the base of surrounding hills where the soil is gray and less well drained (Ferguson 1991).

Second-growth deciduous forest, mainly maple, beech, yellow-poplar, oak, and hickory, covers about 65 percent of the survey area. On cool hillsides, these species are mixed with buckeye and basswood. On

Figure 2.—Carrs Fork Reservoir in Knott County. The soils in this area are in the Shelocta-Highsplint-Cloverlick-Kimper general soil map unit.

moderately deep ridgetop soils, oak or oak mixed with pine is common. Some hemlock grows in deep ravines.

Most of the original forest has been cleared on the stream flood plains and terraces. These cleared areas are used for pasture, for hay or corn, or as sites for residential development.

Highways, roads, and railroads in Knott and Letcher Counties generally follow watercourses. A network of highways connects the major communities within these counties to each other and surrounding areas. U.S. Highway 119 connects Harlan, Whitesburg, and Pikeville. Kentucky Route 80 connects Prestonburg, Hindman, and Hazard. It then connects with the Daniel Boone Parkway and Kentucky Route 15 at Hazard.

Knott and Letcher Counties are served by a railroad, but only for the removal of coal. Passenger train service is available in Ashland, Kentucky. A light aircraft airport is located near Whitesburg, and a regional airport is in nearby Perry County.

Topography and Drainage

The landscape of Knott and Letcher Counties dominantly consists of long narrow ridgetops, steep and very steep hillsides, and narrow valleys. The hillsides feed perennial streams with abrasive sediment that slowly cuts through the rock-forming drainageways in a dendritic pattern of hollows and coves. Flood plains and stream terraces are narrow, and level land rarely occurs.

The North Fork of the Kentucky River drains the largest portion of Knott and Letcher Counties. The major tributaries are Troublesome Creek, Lotts Creek, Quicksand Creek, and Carrs Fork, all of which drain into Perry and Breathitt Counties to the northwest. Beaver Creek, Jones Fork, and Rock Fork are tributaries of the Big Sandy River and drain Knott County to the northeast into Floyd County. Another tributary of the Big Sandy River is Elkhorn Creek,

which drains the eastern edge of Letcher County in a northeasterly direction along the foot of Pine Mountain into Pike County. The Poor Fork of the Cumberland River drains the opposite side of Pine Mountain to the southwest into Harlan County.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Baxter and Jeremiah, Kentucky, in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 35.1 degrees F and the average daily minimum temperature is 24.1 degrees F. The lowest temperature on record, which occurred on January 21, 1985, is -19 degrees. In summer, the average temperature is 73 degrees and the average daily maximum temperature is 84.8 degrees. The highest recorded temperature, which occurred on August 22, 1983, is 101 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 40.07 inches. Of this, 20.96 inches, or about 52 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 10.78 inches. The heaviest 1-day rainfall during the period of record was 7.28 inches on March 12, 1963. Thunderstorms occur on about 56 days each year, and most occur in July.

The average seasonal snowfall is about 12.1 inches. The greatest snow depth at any one time during the period of record was 13 inches. On the average, 6 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 58 percent. Humidity is higher at night, and the average at dawn is about 79 percent. The sun shines

Figure 3.—Stockpiles of coal await trucking in an area of Fiveblock and Kaymine soils, 0 to 30 percent slopes, stony. The hillside in the background is being leveled by a mining practice known as mountaintop removal.

63 percent of the time possible in summer and 43 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 8.3 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil lines on the general soil maps match with those of the adjoining counties; however, the names of the soils used are not identical. The differences are due to the design and usage of new mapping techniques and soil series that change the relative proportion of soils

between the counties and to refinements in the national soil classification system.

Most soil lines on the detailed soil maps match with those in adjoining counties but a few do not join. Differences are because of surface mining activities and refinement or modification of the map units through statistical analysis. In most places, the soil names do not fully agree. These differences are the result of improved placement of the soils in the soil classification scheme, resulting in the use of new series names, and from statistical data gathered by transecting the landscapes and laboratory analysis of selected pedons (Miller, McCormack, and Talbot 1979).

General Soil Map Units

The general soil maps in this publication show broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil maps is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil maps can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the maps. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the maps are not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions of Knott County

1. Shelocta-Highsplint-Cloverlick-Kimper

Very deep and deep, well drained, moderately steep to very steep soils that have a loamy subsoil; on hillsides

This map unit is in southwestern Knott County in the watersheds of Balls Fork, Carr Creek, Clear Creek, Lotts Creek, and Troublesome Creek. It consists of steep and very steep hillsides, narrow crested ridgetops, and winding, narrow flood plains (fig. 4). The soils of this map unit are dominantly underlain by stratified, level-bedded bedrock of the lower and middle Pennsylvanian members of the Breathitt Formation. Rock formations are sandstone, siltstone, shale, coal, and a few thin layers of interbedded calcareous shale and limestone. The topography is dissected by numerous small drainageways that feed perennial streams, which eventually empty into the North Fork of the Kentucky River. Elevation ranges from about 900 feet on the valley floors to about 1,600 feet on the ridgetop summits. In most areas slopes range from 20 to 80 percent.

Most of the flood plains in this map unit are cleared and used for crops, hay, or pasture. Pit or embankment ponds have been developed for livestock water. Many of the low stream terraces are also used for residential, commercial, and industrial sites. Some of the valley floors have been filled to provide level land that is above the flood plain. The communities of Amburgey, Brinkley, Carrie, Cody, Cordia, Emmalena, Fiesty, Leburn, Mallie, Pine Top, Soft Shell, Redfox, Vest, and the City of Hindman are located in this map unit. The steep and very steep hillsides and ridgetops are generally in secondary growth hardwood forest with some areas cleared for pasture.

This map unit makes up about 47 percent of Knott County. It is about 17 percent Shelocta and similar soils, 15 percent Highsplint and similar soils, 10 percent Cloverlick and similar soils, and 10 percent Kimper and similar soils. The remaining 48 percent is minor soils, dissimilar soils, and miscellaneous areas.

Shelocta soils are deep and well drained. They are in coves, on side slopes, on benches, and on footslopes of hillsides with dominantly warm aspects. Slopes range from 12 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid shale, siltstone, and sandstone. Typically, the surface layer is brown silt loam. The subsoil is yellowish brown and strong brown silt loam in the upper part and yellowish brown very channery silt loam in the lower part.

Highsplint soils are very deep and well drained. They are on upper side slopes, head slopes, benches, and footslopes of hillsides with warm or cool aspects. Slopes range from 30 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered dominantly from sandstone and siltstone. Typically, the surface layer is brown channery silt loam. The subsoil is dark yellowish brown and yellowish brown channery silt loam and very channery silt loam.

Cloverlick soils are very deep and well drained. They are in coves, along drainageways, on benches, on concave side slopes, and on footslopes of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 30 to 65 percent. These soils

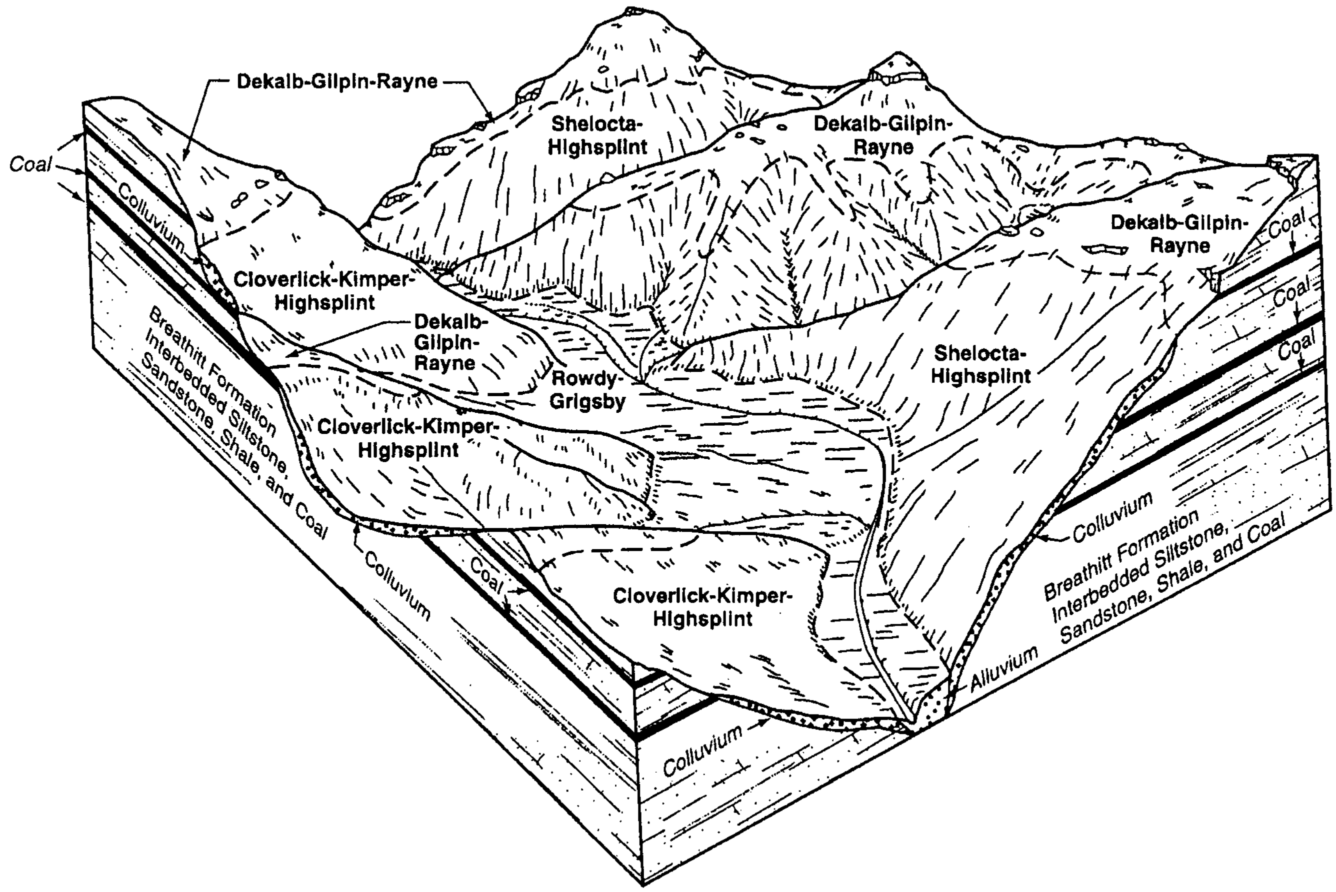

Figure 4.—Typical pattern of soils and their relationship to geology and topography in the Shelocta-Highsplint-Cloverlick-Kimper general soil map unit in Knott County.

formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is very dark grayish brown channery loam. The subsoil is yellowish brown. It is very channery loam in the upper part, very flaggy loam in the middle part, and very channery loam in the lower part.

Kimper soils are very deep and well drained. They are on linear side slopes, head slopes of coves, and narrow benches of hillsides with dominantly cool aspects. Slopes range from 30 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is dark brown silt loam. The subsoil is brown and yellowish brown silt loam in the upper part and brown very channery loam in the lower part.

Soils of minor extent are Dekalb, Fairpoint, Fiveblock, Gilpin, Grigsby, Kaymine, Rayne, and Rowdy soils and Udorthents. Dekalb, Gilpin, and Rayne soils are on ridgetops. Fairpoint, Fiveblock, and Kaymine soils are in areas that have been surface mined. Grigsby soils are on flood plains. Rowdy soils are on low stream terraces adjacent to flood plains. Udorthents consist mainly of transported soil or rock materials on flood plains or along major roads.

The soils of this map unit are used mainly for woodland. Some soils of minor extent on footslopes are used for pasture, homesites, or gardens.

Except for the narrow flood plains and sloping and moderately steep soils of minor extent on footslopes, the soils of this map unit are generally unsuited to cultivated crops, hay, and pasture. The major soil management concerns are the slope, the hazard of erosion, an equipment limitation, and plant competition.

These soils are suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to woodland wildlife. Protection from fire, the planting of wildlife food plots, and development of water supplies enhance wildlife habitat.

2. Handshoe-Cloverlick-Fedscreek-Marrowbone

Very deep and moderately deep, well drained, steep and very steep soils that have a loamy subsoil; on hillsides and ridgetops

This map unit is in northern Knott County in the watersheds of Buckhorn Creek, Rock Fork, Saltlick Creek, and Quicksand Creek. It consists of steep and very steep hillsides, narrow crested ridgetops, and narrow flood plains (fig. 5). The soils of this map unit are underlain by stratified, level-bedded, acid to slightly calcareous bedrock of the lower and middle Pennsylvanian members of the Breathitt Formation. Rock formations are sandstone, siltstone, shale, coal, and thin beds of calcareous siltstone and limestone. Rock outcrops are common on ridgetop summits, on nose slopes, and in some of the coves along drainageways. The topography is dissected by a dendritic drainage pattern made up of numerous small drainageways and a few perennial streams that empty into the North Fork of the Kentucky River or the Levisa Fork of the Big Sandy River. Elevation ranges from 900

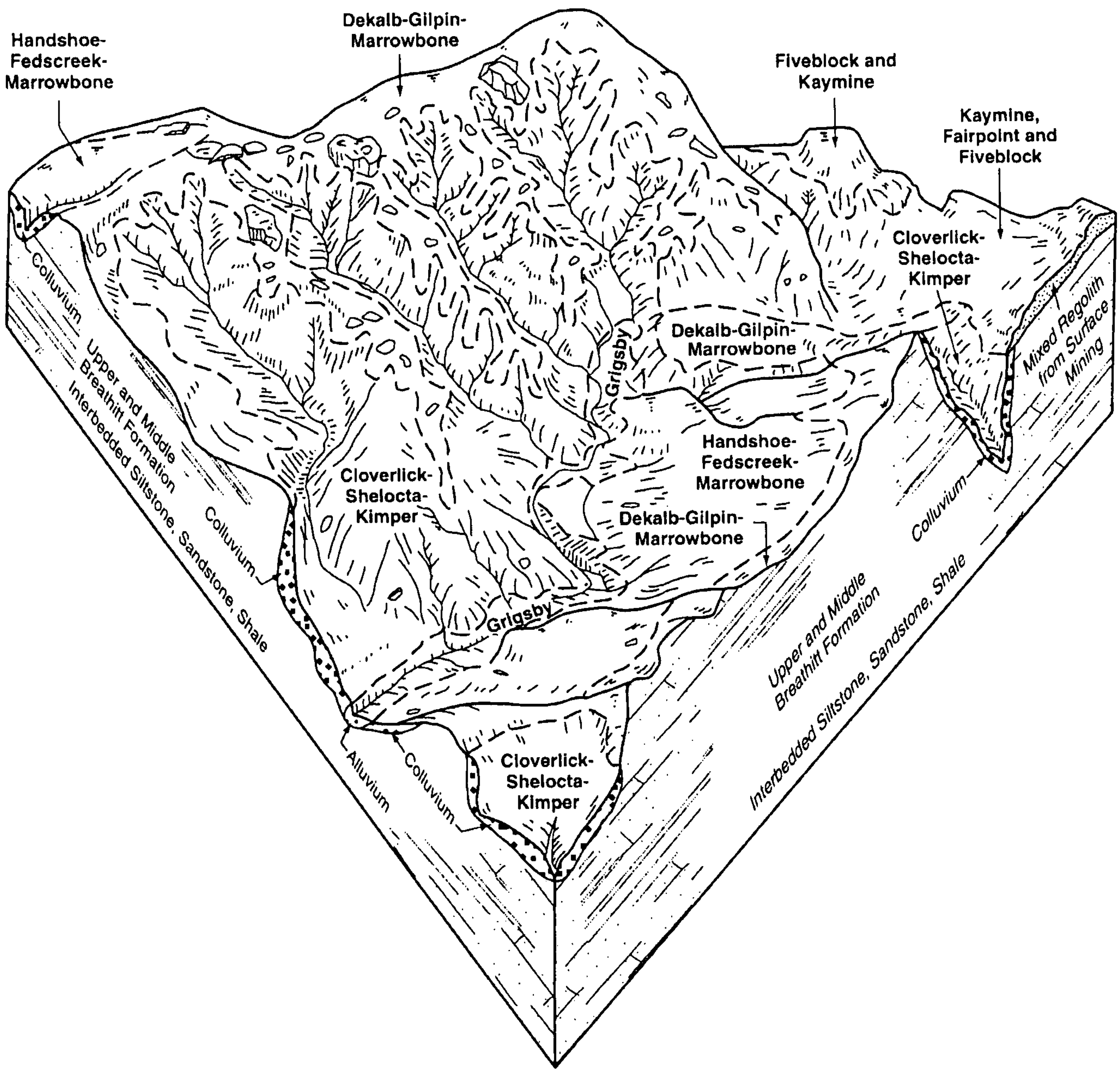

Figure 5.—Typical pattern of soils and their relationship to geology and topography in the Handshoe-Cloverlick-Fedscreek-Marrowbone general soil map unit in Knott County.

feet on the valley floors to about 1,800 feet on the ridgetop summits. Slopes range from 20 to about 80 percent.

Most of the areas of this map unit consist of secondary growth hardwood forest and scattered pine plantations. Cultivated crops and hay are grown on valley floors and sloping to moderately steep footslopes. Some hillsides and recently reclaimed surface mines are used for pasture. Embankment or pit ponds provide livestock water. Except for a few very small communities, such as Elm Rock, Decoy, and Handshoe, developed areas consist of scattered homes along the drainageways. The narrow width of the valleys and ridgetops coupled with the steep and very steep hillsides provide few areas for development. The important structures are residential and commercial buildings, roads, and gas, power, and communications facilities.

This map unit makes up about 21 percent of Knott County. About 12 percent of the unit is Handshoe and similar soils, 10 percent is Cloverlick and similar soils, 10 percent is Fedscreek and similar soils, and 10 percent is Marrowbone and similar soils. The remaining 58 percent consist of minor soils, dissimilar soils, and miscellaneous areas.

Handshoe soils are very deep and well drained. They are in coves, on linear side slopes, on head slopes of drainageways, on nose slopes, and on convex footslopes of hillsides with dominantly warm aspects. Slopes range from 30 to 80 percent. These soils formed in mixed colluvium weathered mainly from acid sandstone. Typically, the surface layer is dark grayish brown very channery loam. The subsoil is yellowish brown very channery loam and very channery sandy loam in the upper part and yellowish brown channery sandy loam and very channery sandy loam in the lower part.

Cloverlick soils are very deep and well drained. They are in coves, along drainageways, on benches, on concave side slopes, and on footslopes of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is very dark grayish brown channery loam. The subsoil is yellowish brown. It is very channery loam in the upper part, very flaggy loam in the middle part, and very channery loam in the lower part.

Fedscreek soils are very deep and well drained. They are on linear side slopes, benches, and convex footslopes of hillsides with dominantly warm aspects. Slopes range from 30 to 80 percent. These soils formed in mixed colluvium weathered dominantly from sandstone. Typically, the surface layer is brown sandy loam. The subsoil is dark yellowish brown, yellowish brown, and strong brown sandy loam.

Marrowbone soils are moderately deep and well drained. They are on shoulder slopes and rounded crests of ridgetops and on nose slopes and upper side slopes of hillsides with dominantly warm aspects. Slopes range from 20 to 80 percent. These soils formed in mixed colluvium or residuum, weathered mainly from sandstone. Typically, the surface layer is very dark grayish brown fine sandy loam. The subsoil is yellowish brown fine sandy loam in the upper part and brownish sandy loam in the lower part.

Soils of minor extent are Dekalb, Fairpoint, Fiveblock, Gilpin, Grigsby, Kaymine, Kimper, Rowdy, and Shelocta soils and Udorthents. Dekalb and Gilpin soils are on ridgetops. Fairpoint, Fiveblock, and Kaymine soils are in surface-mined areas. Shelocta soils are on hillsides. Grigsby soils are on flood plains. Kimper soils are on hillsides with dominantly cool aspects. Rowdy soils are on low-lying stream terraces adjacent to flood plains. Udorthents consist mainly of transported soil or rock materials on flood plains or along major roads.

The soils of this map unit are used mainly for woodland. Some soils of minor extent on footslopes are used for pasture, homesites, or gardens.

Except for the soils on narrow flood plains and the sloping and moderately steep soils of minor extent on footslopes, the soils of this map unit are generally unsuited to cultivated crops, hay, and pasture. The major soil management concerns are the slope, the hazard of erosion, an equipment limitation, and plant competition.

These soils are suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to woodland wildlife. Protection from fire, the planting of wildlife food plots, and development of water supplies enhance wildlife habitat.

3. Shelocta-Cloverlick-Fedscreek-Kimper

Very deep and deep, steep and very steep, well drained soils that have a loamy subsoil; on hillsides

This map unit is in northeastern Knott County in the watersheds of Caney Creek, Jones Fork, and Beaver Creek. It consists of steep and very steep hillsides, narrow crested ridgetops, and sloping valleys that are long and winding (fig. 6). The soils of this map unit are underlain by stratified acid to slightly calcareous bedrock of the lower and middle Pennsylvanian members of the Breathitt Formation. Rock formations

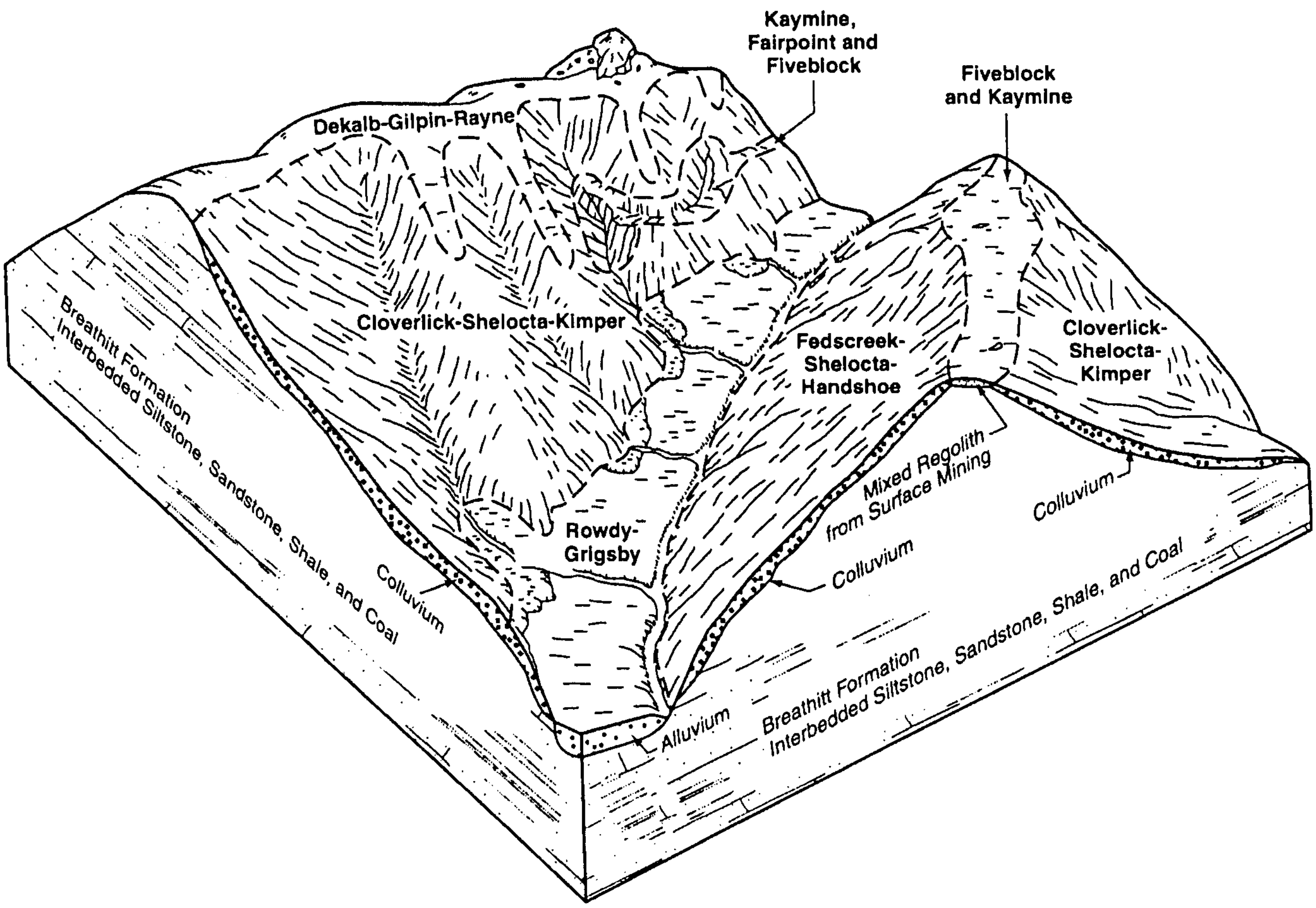

Figure 6.—Typical pattern of soils and their relationship to geology and topography in the Shelocta-Cloverlick-Fedscreek-Kimper general soil map unit in Knott County.

are interbedded sandstone, siltstone, shale, and coal. The topography is dissected by a dendritic pattern of many small drainageways, intermittent streams, and a few perennial streams emptying into the Levisa Fork of the Big Sandy River. Elevations range from 800 feet on the valley floors to about 2,000 feet on the ridgetop summits. Slopes generally range from about 25 to 80 percent.

Most of this map unit consists of secondary growth hardwood forest and a few scattered pine plantations. Cultivated crops and hay are grown on the valley floors and in a few moderately steep areas on narrow ridgetops and footslopes. Steep and very steep hillsides are also used for pasture in a few places. Embankment ponds and spring developments provide livestock water. Small communities such as Dema, Larkslane, Kite, Mousie, Pippapasses, and Topmost are typical of this map unit. Most of the improvements in this area consist of commercial buildings and houses along the drainageways. The narrow valleys and ridgetops, as well as the steep and very steep hillsides, restrict development. The important structures are residential and commercial buildings, roads, schools, and gas, power, water, and communication facilities.

This map unit makes up about 32 percent of Knott County. It is about 20 percent Shelocta and similar soils, 10 percent Cloverlick and similar soils, 10 percent Fedscreek and similar soils, and 9 percent Kimper and similar soils. The remaining 51 percent is minor soils, dissimilar soils, and miscellaneous areas.

Shelocta soils are deep and well drained. They are in coves, on side slopes, on benches, and on footslopes of hillsides with dominantly warm aspects. Slopes range from 12 to 80 percent but are mostly 30 to 80 percent. These soils formed in mixed colluvium weathered from acid shale, siltstone, and sandstone. Typically, the surface layer is brown silt loam. The subsoil is strong brown silt loam in the upper part and yellowish brown very channery silt loam in the lower part.

Cloverlick soils are very deep and well drained. They are in coves, along drainageways, on benches, on concave side slopes, and on footslopes of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is very dark grayish brown channery loam. The subsoil is yellowish brown. It is very channery loam in the upper part, very flaggy loam in the middle part, and very channery loam in the lower part.

Fedscreek soils are very deep and well drained. They are on linear side slopes, benches, and convex footslopes of hillsides with dominantly warm aspects. Slopes range from 30 to 80 percent. These soils formed in mixed colluvium weathered mainly from sandstone, siltstone, and shale. Typically, the surface layer is brown sandy loam. The subsoil is dark yellowish brown, yellowish brown, and strong brown sandy loam.

Kimper soils are very deep and well drained. They are on linear side slopes, head slopes of coves, and narrow benches of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 20 to 70 percent. These soils formed in mixed colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is dark brown silt loam. The subsoil is brown and yellowish brown silt loam in the upper part and brown very channery loam in the lower part.

Soils of minor extent are Dekalb, Fairpoint, Fedscreek, Fiveblock, Gilpin, Grigsby, Handshoe, Marrowbone, and Rowdy soils and Udorthents. Dekalb, Gilpin, and Marrowbone soils are on ridgetops. Fairpoint, Fiveblock, and Kaymine soils are in surface-mined areas. Grigsby soils are on flood plains. Fedscreek and Handshoe soils are on hillsides with dominantly warm aspects. Rowdy soils are on low stream terraces and alluvial fans. Udorthents consist mainly of transported soil or rock materials on flood plains or along major roads.

Most of the soils of this map unit are used for woodland. Some soils of minor extent on footslopes are used for pasture, homesites, or gardens.

Except for the soils on narrow flood plains and the sloping and moderately steep soils of minor extent on footslopes, the soils of this map unit are generally unsuited to cultivated crops, hay, and pasture. The major soil management concerns are the slope, the hazard of erosion, an equipment limitation, and plant competition.

These soils are suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to woodland wildlife. Protection from fire, the planting of wildlife food plots, and development of water supplies enhance wildlife habitat.

Soil Descriptions of Letcher County

1. Shelocta-Highsplint-Cloverlick-Kimper

Very deep and deep, well drained, steep and very steep soils that have a loamy subsoil; on hillsides

This map unit is in western and central Letcher County, north of Pine Mountain. It consists of steep and very steep hillsides, narrow crested ridgetops, and narrow flood plains (fig. 7). Level-bedded, dominantly acid bedrock of the Pennsylvanian-aged lower and middle members of the Breathitt Formation underlie the soils of this map unit. Rock formations are sandstone, siltstone, shale, coal, and some limestone. Elevations range from 600 feet on the valley floors to about 1,200 feet on the ridgetop summits. Slopes in most areas range from 6 to about 65 percent but are mostly 12 to 65 percent.

Most areas of this map unit consist of hardwood forest and scattered pine plantations. Cultivated crops and hay are grown on valley floors and on some moderately steep footslopes and ridgetops. A dendritic drainage pattern of many intermittent streams and a few perennial streams is typical. Embankment ponds are common in the narrow drainageways. Except for a few small communities such as Cowan, Colson, Isom, Kingdom Come, Deane, and Premium, most of the development consists of scattered farmsteads and homes along the drainageways and of buildings and structures associated with mines. The narrow valleys and ridges coupled with steep side slopes restrict development. The important structures are residential and commercial buildings, coal tipples, schools, roads, and gas, power, water, and communication facilities.

This map unit makes up about 52 percent of Letcher County. It is about 20 percent Shelocta and similar soils, 15 percent Highsplint and similar soils, 10 percent Cloverlick and similar soils, and 10 percent Kimper and similar soils. The remaining 45 percent is minor soils, dissimilar soils, and miscellaneous areas.

Shelocta soils are deep and well drained. They are in coves, on side slopes, on benches, and on footslopes of hillsides with dominantly warm aspects. Slopes range from 12 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid shale, siltstone, and sandstone. Typically, the surface layer is brown silt loam. The

Figure 7.—Typical topography and land use in the Shelocta-Highsplint-Cloverlick-Kimper general soil map unit in Letcher County.

subsoil is yellowish brown and strong brown silt loam in the upper part and yellowish brown very channery silt loam in the lower part.

Highsplint soils are very deep and well drained. They are on upper side slopes, head slopes of drainageways, and benches of hillsides with both warm and cool aspects. Slopes range from 30 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid sandstone and siltstone. Typically, the surface layer is brown channery silt loam. The subsoil is dark yellowish brown and yellowish brown channery and very channery silt loam.

Cloverlick soils are very deep and well drained. They are in coves, along drainageways, on benches, on concave side slopes, and on footslopes of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is very dark grayish brown channery loam. The subsoil is yellowish brown. It is very channery loam in the upper part, very flaggy loam in the middle part, and very channery loam in the lower part.

Kimper soils are very deep and well drained. They are on linear side slopes, head slopes of coves, and narrow benches of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is dark brown silt loam. The subsoil is brown and yellowish brown silt

loam in the upper part and brown very channery loam in the lower part.

Soils of minor extent are Dekalb, Fairpoint, Fiveblock, Gilpin, Grigsby, Rayne, and Rowdy soils and Udorthents. Dekalb, Gilpin, and Rayne soils are on ridgetops. Grigsby soils are on flood plains. Fairpoint, Fiveblock, and Kaymine soils are in surface-mined areas. Rowdy soils are on low-lying stream terraces adjacent to flood plains. Udorthents consist mainly of transported soil or rock materials on flood plains or along major roads.

The soils of this map unit are used mainly for woodland. Some soils of minor extent on footslopes are used for pasture, homesites, or gardens.

Except for the soils on narrow flood plains and the sloping and moderately steep soils of minor extent on footslopes, the soils of this map unit are generally unsuited to cultivated crops, hay, and pasture. The major soil management concerns are the slope, the hazard of erosion, an equipment limitation, and plant competition.

These soils are suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to woodland wildlife. Protection from fire, the planting of wildlife food plots, and development of water supplies enhance wildlife habitat.

2. Grigsby-Urban land-Udorthents-Rowdy

Very deep, well drained, nearly level to steep soils that have a loamy subsoil and urban land; on flood plains, terraces, and footslopes

This map unit is in central Letcher County along the North Fork of the Kentucky River and Rockhouse Creek. It consists of alluvial fans, stream terraces, and narrow flood plains (fig. 8). Stratified, level-bedded, dominantly acid sandstone, siltstone, and shale of the Pennsylvanian and lower and middle members of the Breathitt Formation underlie the soils of this map unit. The topography is dissected by numerous small drainageways that feed perennial streams and the Kentucky River. Elevations range from 800 to about 1,200 feet. Slopes range from 0 to 30 percent but are mostly 0 to 15 percent.

Most of the communities of Red Star, Letcher, Jeremiah, Premium, Whitco, Ermine, Mayking, and the City of Whitesburg are Urban land. In many places, Udorthents have been used to fill the flood plains, especially along major roads. The steep footslopes are generally in secondary growth hardwood forest, but some areas have remained cleared for pasture.

This map unit makes up about 2 percent of Letcher County. This unit is about 30 percent Grigsby and similar soils, 20 percent Urban land, 15 percent Udorthents, and 13 percent Rowdy and similar soils. The remaining 22 percent consists of minor soils, dissimilar soils, and miscellaneous areas.

Grigsby soils are very deep and well drained. They are on flood plains of the Kentucky River and Rockhouse Creek. Slopes range from 0 to 6 percent. These soils formed in alluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is brown sandy loam. The subsoil is dark brown and dark yellowish brown sandy loam.

Urban land is areas covered by streets, parking lots, buildings, residences, and other structures where identification of the underlying soil is not feasible. Slopes range from 0 to 15 percent but are mostly 0 to 6 percent. Most of the Urban land consists of towns and small cities, but it also includes cemeteries, commercial building sites, industrial sites, parking lots, playgrounds, railroad yards, school yards, shopping centers, and sewage treatment plants. Some of the Urban land in this map unit is subject to rare flooding of short duration.

Udorthents consist of a mixture of soil and rock material that has been drastically disturbed. In most places, the soil material has been transported several hundred yards from cut areas to a fill site. Because Udorthents material is highly variable, a typical pedon is not given. The content of clay ranges from about 5 to 45 percent, and the content of sand ranges from about 25 to 80 percent. Texture and permeability of these soils vary greatly within short distances. Some of the Udorthents in this map unit are subject to rare flooding of short duration.

Rowdy soils are very deep and well drained. They are on low stream terraces and alluvial fans along the Kentucky River and Rockhouse Creek. Slopes range from 0 to 4 percent. These soils formed in mixed alluvium weathered from sandstone, siltstone, and shale. Typically, the surface layer is brown loam. The subsoil is yellowish brown silt loam and loam.

The soils of minor extent are Allegheny, Cloverlick, Gilpin, Highsplint, Holly, Itmann, Kimper, and Shelocta. Allegheny soils are on stream terraces. Holly soils are in wet spots on flood plains. Itmann soils are in and around coal-processing areas and stockpiles. Cloverlick, Highsplint, Kimper, and Shelocta soils are on hillsides.

Most of the alluvial fans, stream terraces, and flood plains of this map unit are cleared and used as sites for homes and commercial buildings or for growing cultivated crops, hay, or pasture.

Figure 8.—Typical topography and land use in the Grigsby-Urban land-Udorthents-Rowdy general soil map unit in Letcher County.

Areas of Grigsby and Rowdy soils on nearly level or gently sloping flood plains and Allegheny soils on gently sloping or sloping terraces are suited to all cultivated crops commonly grown in the survey area. These soils are also suited to specialty crops such as vegetables and nursery plants. The main limitations affecting farming are flooding and wetness in low areas.

Areas of Grigsby and Rowdy soils are suited to woodland and woodland wildlife habitat. Protection from fire, the planting of wildlife food plots, and development of water supplies are good management measures.

Most of the stream terraces and footslopes in this map unit are suited to building site development. The major soil limitation for dwellings without basements is the slope. For dwellings with basements, depth to bedrock may be a limitation in places. Soil limitations for septic tank absorption fields are the slope and, in places, slow permeability. Some areas have excessive slopes and, without major grading, are unsuited to building site development.

3. Kimper-Cloverlick-Renox-Highsplint

Very deep, well drained, steep and very steep soils that have a loamy subsoil; on Pine Mountain and adjacent foothills

This map unit is in southern Letcher County on the northwestern face of Pine Mountain, a prominent linear ridge formed through faulting. This map unit consists of steep and very steep, benched side slopes separated from ridgetops by sandstone escarpments in the form of cliffs and narrow ledges (fig. 9). The upper part of the north and west sides, which are referred to as scarp slopes, are the eroded edges of upturned rock strata of Mississippian and Devonian ages, consisting of shale, limestone, and sandstone. These strata were thrust up and over the Pennsylvanian-aged interbedded shale, siltstone, sandstone, and coal rock strata. The result is a steep scarp slope, known as an overthrust fault, above a series of dissected foothills. Rock strata on the upper side slopes are dominantly sandstone, siltstone, and shale; whereas those on benches and

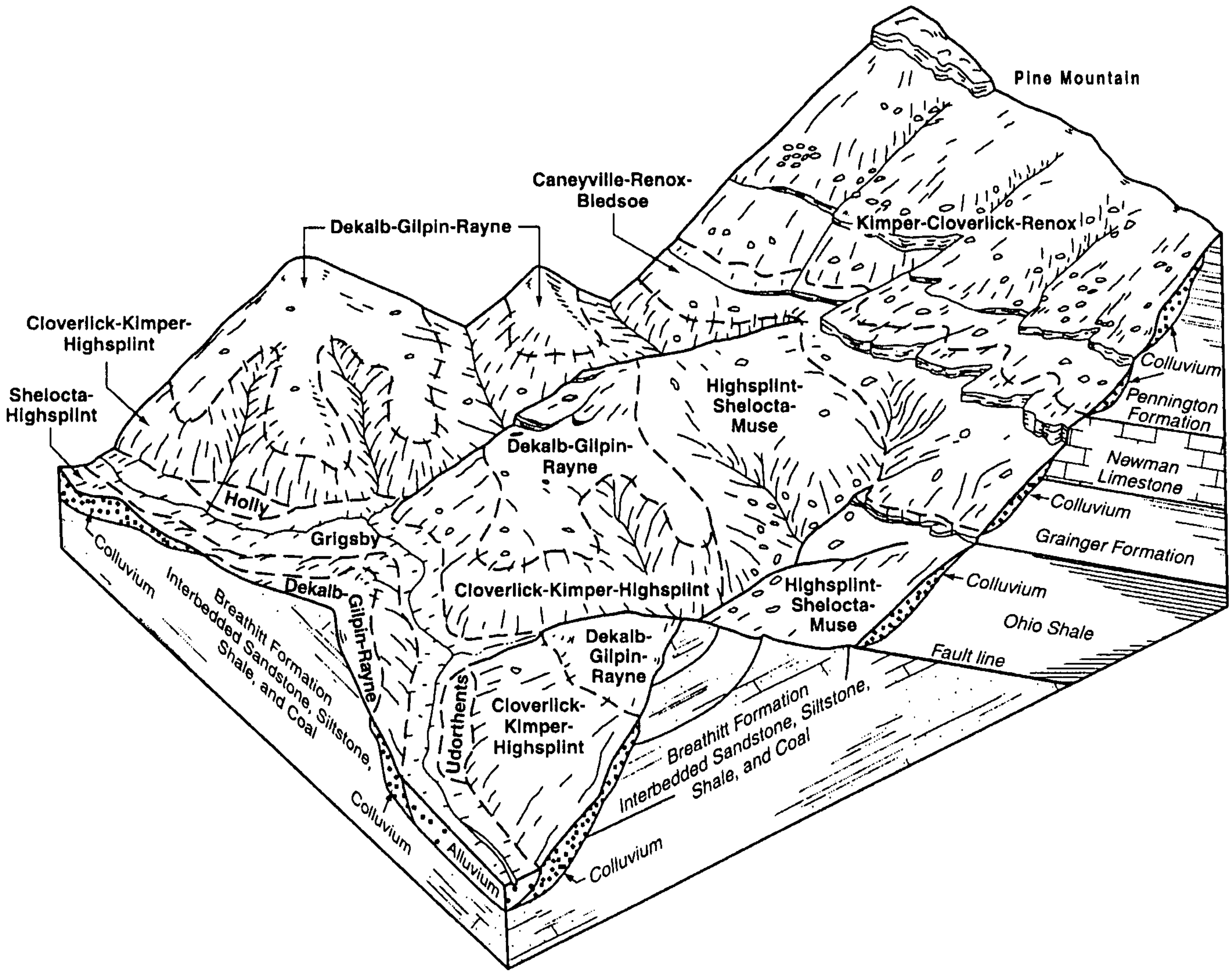

Figure 9.—Typical pattern of soils and their relationship to geology and topography in the Kimper-Cloverlick-Renox-Highsplint general soil map unit in Letcher County.

lower on the side slopes are dominantly limestone, siltstone, and shale. Rock strata on the lower side slopes consist of siltstone, shale, sandstone, and coal. Cliffs and rock outcrops are common on the middle and upper side slopes and are bands of bedrock tilted at angles of 30 to 45 degrees. Elevations range from 1,600 feet on the lower slopes to 2,600 feet just below the ridgetop crest. Slopes in most areas range from 30 to 80 percent and include some areas of sandstone or limestone rock outcrop.

Most areas of this map unit are now in secondary hardwood forest, although much of the lower slopes were once cleared for pasture and row crops. A few areas along the narrow benches and on nose slopes are still cleared for pasture or used for homesites.

This map unit makes up about 6 percent of Letcher County. It is about 16 percent Kimper and similar soils, 15 percent Cloverlick and similar soils, 12 percent Renox and similar soils, and 8 percent Highsplint and similar soils. The remaining 49 percent is minor soils, dissimilar soils, miscellaneous areas, and areas of rock outcrop.

Kimper soils are very deep and well drained. They are on linear side slopes, head slopes of coves, and narrow benches on the lower and uppermost slopes of Pine Mountain and on foothills at the base of Pine Mountain. Slopes range from 20 to 80 percent but are mostly greater than 30 percent. These soils formed in mixed colluvium weathered mainly from sandstone, siltstone, and shale. Typically, the surface layer is dark

brown silt loam. The subsoil is brown and yellowish brown silt loam in the upper part and brown very channery loam in the lower part.

Cloverlick soils are very deep and well drained. They are in coves, along drainageways, on benches, on concave side slopes, and on footslopes of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is very dark grayish brown channery loam. The subsoil is yellowish brown. It is very channery loam in the upper part, very flaggy loam in the middle part, and very channery loam in the lower part.

Renox soils are very deep and well drained. They are on benches on the upper and middle side slopes of Pine Mountain. Slopes range from 30 to 80 percent. These soils formed in mixed colluvium weathered from siltstone, shale, limestone, and sandstone. Typically, the surface layer is dark yellowish brown silt loam. The subsoil is dark yellowish brown and strong brown channery silt loam and channery loam in the upper part and yellowish brown silty clay loam and channery silty clay loam in the lower part.

Highsplint soils are very deep and well drained. They are on upper side slopes, head slopes, benches, and footslopes on Pine Mountain and foothills at the base of Pine Mountain. Slopes range from 30 to 80 percent. These soils formed in mixed colluvium weathered from acid sandstone and siltstone. Typically, the surface layer is brown channery silt loam. The subsoil is dark yellowish brown and yellowish brown channery silt loam and very channery silt loam.

Soils of minor extent include Berks, Bledsoe, Caneyville, Dekalb, Gilpin, Grigsby, Muse, Rayne, and Shelocta soils and Udorthents. Bledsoe and Caneyville soils are on benches and very steep side slopes in a narrow band on the middle and upper slopes of Pine Mountain. Dekalb, Gilpin, and Rayne soils are on narrow ridgetops adjacent to the footslopes of Pine Mountain. Grigsby soils and Udorthents are on narrow flood plains that head up near the base of Pine Mountain. Muse and Shelocta soils are on the footslope of Pine Mountain. All acres of Pits, dumps, mapped in this survey consist of limestone quarries on the middle slopes of Pine Mountain.

The soils of this map unit are used mainly for woodland. Some soils of minor extent on footslopes are used for pasture, homesites, or gardens.

Except for the soils on narrow flood plains and the sloping and moderately steep soils of minor extent on footslopes, the soils of this map unit are generally unsuited to cultivated crops, hay, and pasture. The major soil management concerns are the slope, the hazard of erosion, an equipment limitation, and plant competition.

These soils are suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to woodland wildlife. Protection from fire, the planting of wildlife food plots, and development of water supplies enhance wildlife habitat.

4. Alticrest-Varilla-Shelocta-Jefferson

Very deep to moderately deep, well drained and somewhat excessively drained, moderately steep to very steep soils that have a loamy subsoil; on Pine Mountain and adjacent hillsides

This map unit is on the south- and southeast-facing side of Pine Mountain in south-central Letcher County, north of the Cumberland River. The underlying bedrock consists of Mississippian- and Pennsylvanian-aged sandstone, siltstone, and shale. The landscape is deeply dissected and characterized by long nose slopes that separate deep coves (fig. 10). The main ravines are about one-half mile apart along the mountainside. The slopes from the crest to the base of the mountain are broken by the edges of many exposed strata, mainly sandstone and siltstone of the Pennington and Lee Formations. Sandstone cliffs and rock outcrops are common on the upper and middle slopes but are less common toward the base, where colluvium is thicker and more shale bedrock occurs. The drainageways commonly form narrow cuestas weathered from sandstone and shale of the Hensley Member of the Lee Formation. The Hance Member of the Breathitt Formation, consisting dominantly of shale, underlies the lower slopes and the base of Pine Mountain. Elevations generally range from about 1,600 feet along the base of the mountain to about 2,800 feet on the crest.

Most areas of this map unit are used for woodland. The small acreage that is farmed consists mostly of the sloping to moderately steep areas on lower slopes and the minor soils on flood plains.

The majority of this map unit is managed for woodland, recreation, and wildlife habitat.

This map unit makes up about 5 percent of Letcher County. It is about 15 percent Alticrest and similar soils, 15 percent Varilla and similar soils, 13 percent Shelocta and similar soils, and 10 percent Jefferson and similar soils. The remaining 47 percent consists of minor soils, dissimilar soils, miscellaneous areas, and areas of rock outcrop.

The moderately deep, somewhat excessively drained Alticrest soils are on shoulder slopes, side

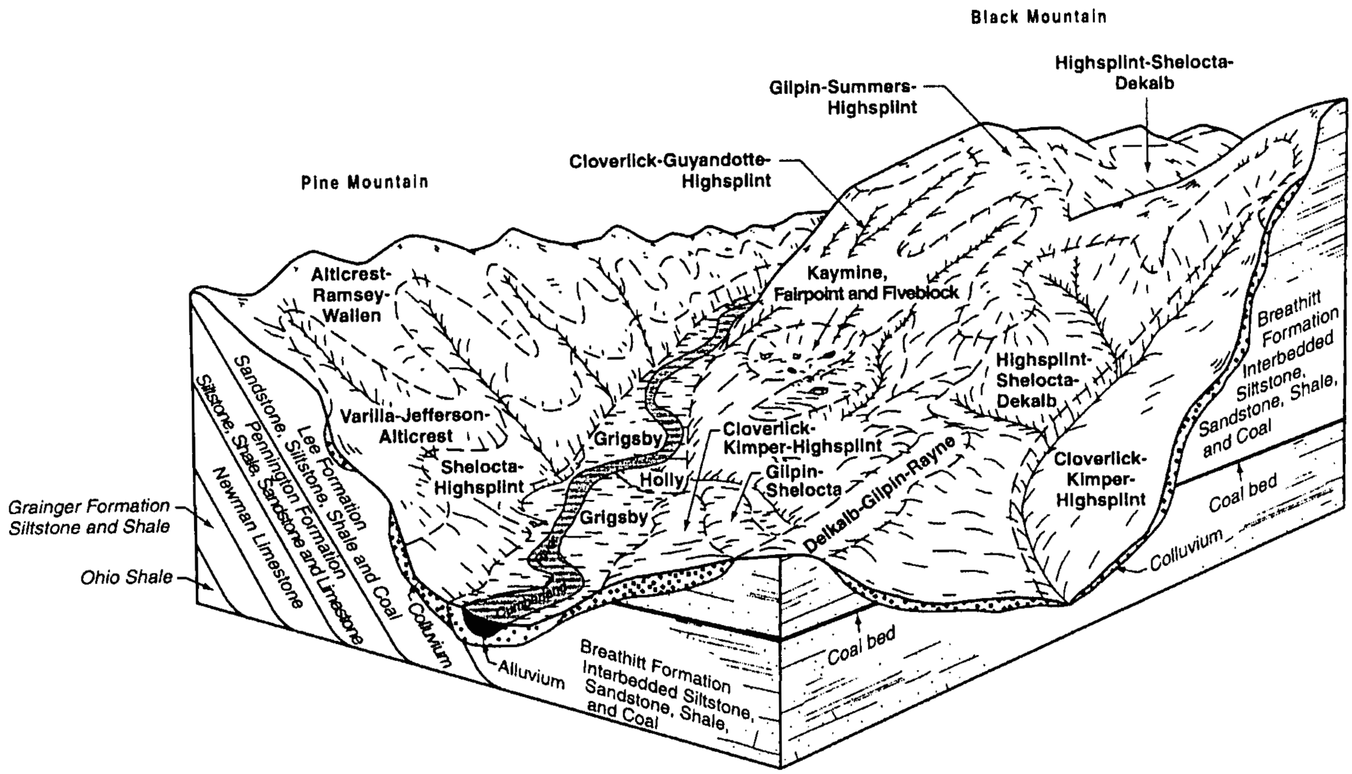

Figure 10.—Typical pattern of soils and their relationship to geology and topography in the Alticrest-Varilla-Shelocta-Jefferson general soil map unit and the Cloverlick-Highsplint-Guyandotte-Shelocta general soil map unit in Letcher County.

slopes, and narrow benches associated with sandstone rock outcrop. Slopes range from 20 to 75 percent. These soils formed in loamy residuum and are underlain by sandstone. Typically, the surface layer is sandy loam. The subsoil is sandy loam and channery sandy loam.

The very deep, somewhat excessively drained Varilla soils are in coves and on side slopes adjacent to or below sandstone rock outcrop. Slopes range from 35 to 75 percent. These soils formed in sandy colluvium. Typically, the surface layer is sandy loam. The subsoil is sandy loam and very channery sandy loam.

The deep, well drained Shelocta soils are in coves and on footslopes near the base of Pine Mountain. Slopes range from 30 to 65 percent. These soils formed in mixed colluvium weathered from acid shale, siltstone, and sandstone. Typically, the surface layer is brown silt loam. The subsoil is yellowish brown and strong brown silt loam in the upper part and yellowish brown very channery silt loam in the lower part.

The very deep, well drained Jefferson soils are in coves and on benches on the middle and upper slopes of the mountain. Slopes range from 35 to 75 percent. These soils formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is loam. The subsoil is loam and channery loam.

Soils of minor extent are Dekalb, Gilpin, Helechawa, Highsplint, Holly, Ramsey, Rayne, and Wallen. Dekalb, Gilpin, and Rayne soils are on low nose slopes between ravines near the base of Pine Mountain. Helechawa soils are in deep ravines near the boundary with Harlan County. Highsplint soils are on lower side slopes near the base of the mountain. Ramsey and Wallen soils are on shoulder slopes, narrow ridges, and divides on the upper slopes of Pine Mountain. Holly soils are in the upper reaches of narrow drainageways near ridgetop divides.

The soils of this map unit are generally unsuited to farming due to steep and very steep slopes and the restrictions presented by stones and rock outcrop. A few nose slopes and footslopes near the base of the mountain are cleared and suitable for pasture. The few gently sloping areas are suited to small gardening.

These soils are suited to woodland. Productivity is moderate on ridgetops and on the south- and west-facing lower side slopes. Productivity is high on the north- and east-facing lower side slopes. Common tree species are shortleaf pine, pitch pine, Virginia pine, white oak, chestnut oak, northern red oak, red maple,

and yellow-poplar. Management concerns are the hazard of erosion, an equipment limitation, and plant competition.

These soils are suited to woodland wildlife habitat. Establishment of nesting areas for waterfowl and protection of the Cave Run Lake watershed from litter and siltation are management priorities.

Most areas of these soils are unsuited to urban uses because of the moderately steep and very steep slopes. Some ridgetop areas, however, are gently sloping or sloping and are used for cottages and recreation homes. A few permanent homesteads also exist near major roads at the base of the mountain.

These soils are suited to recreational uses. Common activities are hunting, fishing, camping, hiking, and riding all terrain vehicles.

5. Cloverlick-Highsplint-Guyandotte-Shelocta

Very deep and deep, well drained, steep and very steep soils that have a loamy subsoil; on Black Mountain and adjacent foothills

This map unit is in southern Letcher County and includes Black Mountain and the Cumberland River Valley. It consists of very steep mountainsides, narrow ridgetops, adjacent foothills, and valleys (fig. 10). Stratified, level-bedded shale, siltstone, and sandstone of the Pennsylvanian-aged Breathitt Formation underlie the soils. Elevations along the ridgetop crest of Black Mountain range from 2,800 to 3,800 feet. Slopes in most areas range from 30 to 80 percent and include some areas of vertical sandstone rock outcrop.

Most areas of these soils are used for woodland. Some limited areas along the major streams and the Cumberland River are used for pasture, row crops, or homesites.

This map unit makes up about 9 percent of Letcher County. It is about 15 percent Cloverlick and similar soils, 15 percent Highsplint and similar soils, 10 percent Guyandotte and similar soils, and 8 percent Shelocta and similar soils. The remaining 52 percent is minor soils, dissimilar soils, and miscellaneous areas.

Cloverlick soils are very deep and well drained. They are in coves, along drainageways, on benches, on concave side slopes, and on footslopes of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is very dark grayish brown channery loam. The subsoil is yellowish brown. It is very channery loam in the upper part, very flaggy loam in the middle part, and very channery loam in the lower part.

Highsplint soils are very deep and well drained. They are on upper side slopes, head slopes, benches, and footslopes on Black Mountain and on foothills at the base of Black Mountain. Slopes range from 30 to 80 percent. These soils formed in mixed colluvium weathered from acid sandstone and siltstone. Typically, the surface layer is dark brown very channery silt loam. The subsoil is yellowish brown very channery silt loam, very channery silty clay loam, and very channery loam.

Guyandotte soils are very deep and well drained. They are in coves and on upper and middle side slopes of Black Mountain with dominantly cool aspects. Slopes range from 30 to 80 percent. These soils formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is very dark gray gravelly loam. The subsoil is brown and yellowish brown gravelly loam, very gravelly loam, and very flaggy loam.

Shelocta soils are deep and well drained. They are on linear side slopes and benches on Black Mountain with dominantly warm aspects and on foothills at the base of Black Mountain. Slopes range from 12 to 80 percent but are mostly greater than 35 percent. These soils formed in loamy colluvium weathered from acid shale, siltstone, and sandstone. Typically, the surface layer is dark grayish brown channery silt loam. The subsoil is yellowish brown and strong brown channery silty clay loam. The substratum is yellowish brown very channery silty clay loam grading to soft siltstone.

Soils of minor extent include Dekalb, Fairpoint, Fiveblock, Grigsby, Itmann, Kaymine, Kimper, Rayne, Rowdy, and Summers soils and Udorthents. Dekalb, Gilpin, and Rayne soils are on the narrow ridgetops of the foothills at the base of Black Mountain. In addition, Gilpin soils are on the ridgetop of Black Mountain and Dekalb soils are on nose slopes with dominantly warm aspects on Black Mountain. Fairpoint, Fiveblock, and Kaymine soils are in surface-mined areas on Black Mountain and adjacent foothills. Grigsby soils are on flood plains along the Cumberland River and some tributary streams. Kimper and Summers soils are on ridgetops on Black Mountain. Rowdy soils are on low stream terraces and alluvial fans along the Cumberland River and major streams. Udorthents are dominantly areas along flood plains that have been filled with transported soil and rock materials. Also included are small areas of urban land along streams and drainageways.

These soils are generally unsuited to farming due to steep and very steep slopes and the restrictions presented by stones and rock outcrop. A few nose slopes and footslopes near the base of the mountain

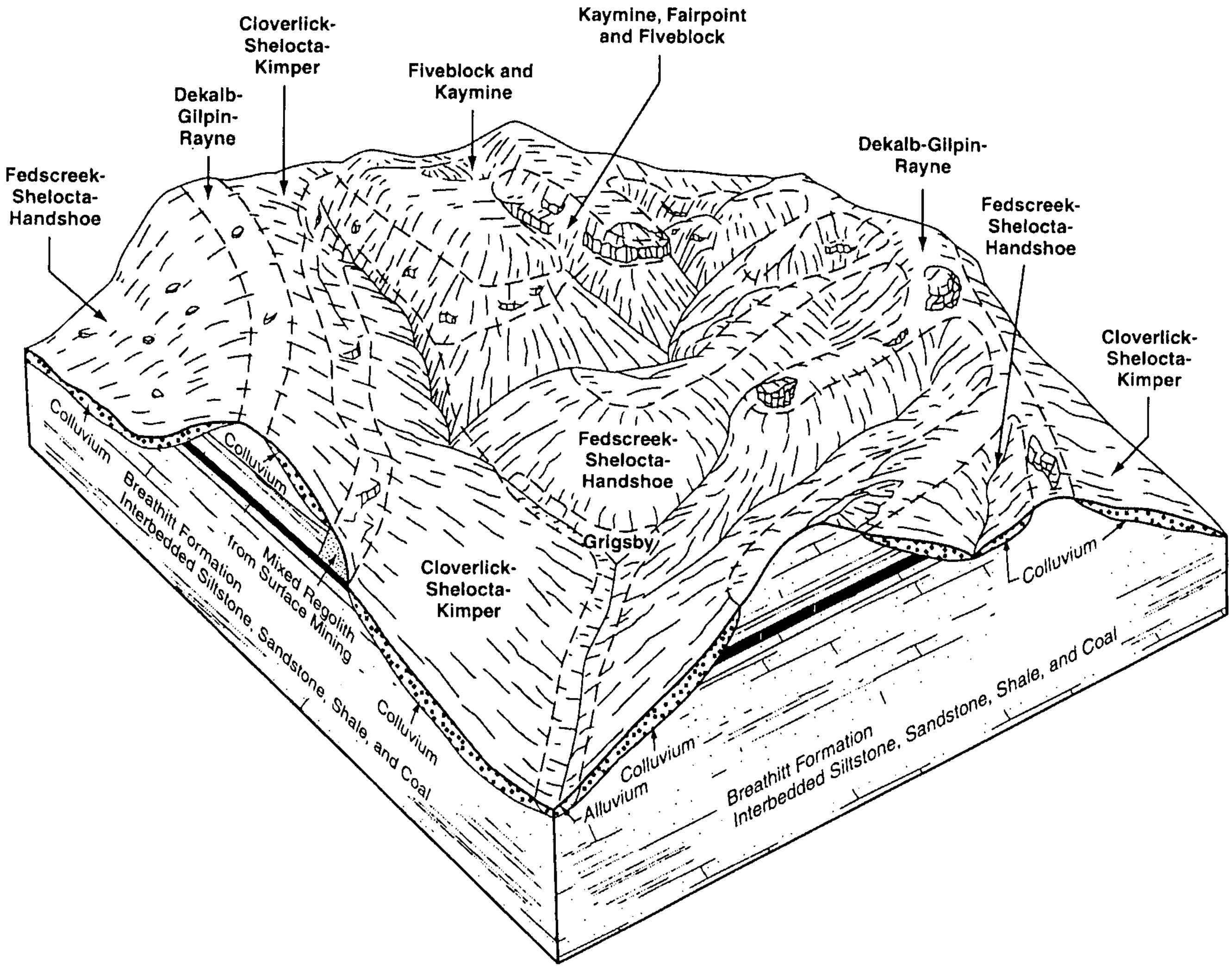

Figure 11.—Typical pattern of soils and their relationship to geology and topography in the Shelocta-Cloverlick-Fedscreek-Dekalb general soil map unit in Letcher County.

are cleared and suitable for pasture. The few gently sloping areas are suited to small gardens.

These soils are suited to woodland. The hazard of erosion, an equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to woodland wildlife. Protection from fire, the planting of wildlife food plots, and development of water supplies enhance wildlife habitat.

6. Shelocta-Cloverlick-Fedscreek-Dekalb

Very deep to moderately deep, steep and very steep, well drained soils that have a loamy subsoil; on hillsides and ridgetops

This map unit is in eastern Letcher County in the watersheds of Camp Branch, Indian Creek, Rockhouse Creek, Millstone Creek, Thorton Creek, Boone Fork, Wright Fork, and Potter Fork. The landscape consists of steep and very steep, sharply crested hillsides separated by nearly level to sloping valleys that are long and winding (fig. 11). The soils of this map unit are underlain by Pennsylvanian-aged, stratified, acid to slightly calcareous bedrock of the lower and middle members of the Breathitt Formation. Rock formations are interbedded sandstone, siltstone, shale, and coal. The topography is dissected by a dendritic pattern of many small drainageways, intermittent streams, and a few perennial streams, most of which empty into the North Fork of the Kentucky River. Elevation ranges from 1,200 feet on the valley floors to about 2,400 feet on the crests. Slopes in most areas range from 25 to about 80 percent.

Most areas of this map unit consist of secondary growth hardwood forest and a few scattered pine plantations. Cultivated crops and hay are grown on the valley floors and a few moderately steep ridgetops and footslopes. Steep and very steep hillsides are also used for pasture in a few places. Embankment ponds and spring developments provide livestock water. Small communities such as Colson, Cromona, Deane, Democrat, Haymond, Hemphill, Kona, Lucastown, Millstone, Seco, Thorton, and Whitaker are located in this map unit. Also included are the larger towns of Fleming-Neon and McRoberts. Most of the improvements in this map unit consist of commercial buildings and homesites along the drainageways. The narrow width of the valleys and ridgetops and the steep and very steep hillsides restrict development. The important structures are residential and commercial buildings, roads, coal tipples, schools, and gas, power, water, and communication facilities.

This map unit makes up about 26 percent of Letcher County. It is about 15 percent Shelocta and similar soils, 10 percent Cloverlick and similar soils, 10 percent Fedscreek and similar soils, and 8 percent Dekalb and similar soils. The remaining 57 percent is minor soils, dissimilar soils, and miscellaneous areas.

Shelocta soils are deep and well drained. They are in coves, on benches, on side slopes, and on footslopes of hillsides with dominantly warm aspects. Slopes range from 12 to 80 percent but are mostly 30 to 80 percent. These soils formed in mixed colluvium weathered from acid shale, siltstone, and sandstone. Typically, the surface layer is brown silt loam. The subsoil is strong brown silt loam in the upper part and yellowish brown very channery silt loam in the lower part.

Cloverlick soils are very deep and well drained. They are in coves, along drainageways, on benches, on concave side slopes, and on footslopes of hillsides with dominantly cool aspects. Slopes range from 20 to 80 percent but are mostly 30 to 65 percent. These soils formed in mixed colluvium weathered from acid sandstone, siltstone, and shale. Typically, the surface layer is very dark grayish brown channery loam. The subsoil is yellowish brown. It is very channery loam in the upper part, very flaggy loam in the middle part, and very channery loam in the lower part.

Fedscreek soils are very deep and well drained. They are on linear side slopes, benches, and convex footslopes of hillsides with dominantly warm aspects. Slopes range from 30 to 80 percent. These soils formed in mixed colluvium weathered mainly from sandstone. Typically, the surface layer is brown sandy loam. The subsoil is dark yellowish brown, yellowish brown, and strong brown sandy loam.

Dekalb soils are moderately deep and well drained. They are on sharp crests, nose slopes, and head slopes on ridgetops. Slopes range from 20 to 80 percent. These soils formed in residuum or colluvium weathered from sandstone. Typically, the surface layer is very dark grayish brown sandy loam. The subsoil is yellowish brown channery and very channery sandy loam.

Soils of minor extent are Fairpoint, Fiveblock, Gilpin, Grigsby, Handshoe, Kaymine, Kimper, and Marrowbone soils and Udorthents. Gilpin and Marrowbone soils are on ridgetops. Fairpoint, Fiveblock, and Kaymine soils are in surface-mined areas. Grigsby soils are on flood plains. Handshoe soils are on hillsides with warm aspects. Kimper soils are on hillsides with cool aspects. Most Udorthents are areas where the flood plain has been filled with unconsolidated soil and rock materials, but a few areas are excavated sites on hillsides. Also included are areas of urban land, dominantly in and around the City of Fleming-Neon.

The soils of this map unit are used mainly for woodland. Some soils of minor extent on footslopes are used for pasture, homesites, or gardens.

Except for the soils on narrow flood plains and the sloping and moderately steep soils of minor extent on footslopes, the soils of this map unit are generally unsuited to cultivated crops, hay, and pasture. The major soil management concerns are the slope, the hazard of erosion, an equipment limitation, and plant competition.

These soils are suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. These soils are also suited to woodland wildlife. Protection from fire, the planting of wildlife food plots, and development of water supplies enhance wildlife habitat.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed; consequently, they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Allegheny loam, 2 to 15 percent slopes, is a phase of the Allegheny series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Shelocta-Highsplint complex, 30 to 65 percent slopes, very stony, is an example.

An *undifferentiated group* is made up of two or more

soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Fiveblock and Kaymine soils, 0 to 30 percent slopes, stony, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

AlC—Allegheny loam, 2 to 15 percent slopes

This very deep, well drained, gently sloping to moderately steep soil is on stream terraces along the Cumberland River, Kentucky River, and major streams throughout the survey area. Slopes generally are smooth and convex but are commonly dissected by small drainageways. Most areas are in the shape of irregular bands or small ovals. They range from 5 to about 30 acres in size.

Typically, the surface layer is brown loam about 7 inches thick. The subsoil, to a depth of about 72 inches, is yellowish brown and brownish yellow loam. The substratum is brownish yellow, mottled clay loam. Depth to bedrock is more than 80 inches. In some areas the surface layer is eroded, and in other areas it is more than 10 inches thick.

This soil has medium natural fertility and moderate organic matter content. Permeability is moderate, available water capacity is high, and surface runoff is medium. This soil is easy to till and can be worked throughout a wide range in moisture content. The root zone is very deep and easily penetrated.

Included with this soil on narrow footslopes are small areas of Handshoe and Shelocta soils that protrude slightly into mapped areas. Also, small areas of Rowdy and Holly soils are along narrow drainageways. In places, soils with a perched water table at a depth of 1.5 to 2.0 feet are intermingled with the Allegheny soil on similar landforms. These included soils make up about 20 percent of the map unit, but individual areas of these soils usually are less than 2 acres in size.

The Allegheny soil is used mainly for homesites and for growing hay and pasture (fig. 12). In a few places, it is used for growing cultivated crops, mainly corn.

This soil is suited to cultivated crops and pasture, and high yields can be obtained if the soil is properly managed. Erosion is a limitation if conventional tillage is used. Returning crop residue to the soil and using grasses and legumes as cover crops maintain tilth and an adequate organic matter content. In some areas, runoff from adjacent hillsides can cause gully erosion or deposit rock fragments on the surface. This runoff can be controlled by diversion ditches or grassed waterways. Pastures should be renovated frequently enough to maintain the desired plants. Grazing before plants are well established, overgrazing, or grazing when the soil is wet damages pasture plants and results in a thin cover and increase in weed competition. Applying lime and fertilizer, using proper seeding rates and mixtures, rotating grazing, and controlling weeds are important practices for producing quality hay and forage on this soil.

This soil is suited to woodland, although most areas have been cleared. Yellow-poplar, eastern white pine, shortleaf pine, black walnut, black cherry, and northern red oak are suitable trees for planting. Plant competition is the major management concern because site conditions favor the growth of invading species.

The potential for openland wildlife habitat on this soil is good. The habitat can be maintained or improved by providing food, cover, water, nesting areas, and den sites. Small ponds can provide water for wetland species. Field borders are also good habitat areas for wildlife. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover for wildlife. The habitat in areas of native plants can be improved by disking and applying fertilizer.

This soil is suited to most urban uses, but the slope is a limitation. For septic systems, slow permeability is a moderate concern.

This soil is in capability subclass IIIe.

AtF—Alticrest-Ramsey-Wallen complex, 20 to 55 percent slopes, rocky

These moderately deep and shallow, steep and very steep, somewhat excessively drained soils are on irregular knolls and ridges between deep ravines on the southeast-facing slopes of Pine Mountain. Elevations along the ridges and mountain crests range from about 1,800 to 3,100 feet. The higher elevations receive more snow during the winter than the lower elevations and may receive more rainfall during the summer. The shape of the downward slope of the mountain is very

Figure 12.—A terrace landform in an area of Allegheny loam, 2 to 15 percent slopes. The hillside in the background is in an area of Cloverlick-Kimper-Highsplint complex, 30 to 65 percent slopes, very stony.

irregular, and knolls or cliffs break the slopes. Across the slope, the shape ranges from almost linear to strongly convex. Sandstone rock outcrops and cliffs are on narrow knolls, but stones and boulders cover less than 5 percent of the surface in most places. Most areas are long and narrow and range from 20 to about 1,000 acres in size.

Alticrest and similar soils make up about 35 percent of this map unit, Ramsey and similar soils about 30 percent, and Wallen and similar soils about 20 percent. Rock outcrop makes up about 2 percent and minor soils the remaining 13 percent. These soils are in a regular repeating pattern on the landscape, but they are so intermingled that they could not be separated at the scale chosen for mapping.

Typically, the surface layer of the Alticrest soil is dark grayish brown sandy loam about 3 inches thick. The subsoil, to a depth of 25 inches, is yellowish brown sandy loam and channery sandy loam. The substratum is weathered sandstone to a depth of 30 inches. Sandstone bedrock is at a depth of 30 inches. In some areas, the subsoil is sandy clay loam. In other areas, it has no rock fragments.

The Alticrest soil has low natural fertility and low or moderate organic matter content. Permeability is moderately rapid, and the available water capacity is moderate. Surface runoff is medium, and the root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Ramsey soil is dark brown sandy loam about 1 inch thick. The subsoil, to a depth of about 17 inches, is yellowish brown loam, sandy loam, and channery sandy loam. Fractured sandstone is at a depth of 17 inches. In some areas, the subsoil is sand or loamy sand throughout. In other areas, it has more rock fragments.

The Ramsey soil has low natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is very low. Surface runoff is medium. The root zone is shallow. Depth to bedrock ranges from 17 to 20 inches.

Typically, the surface layer of the Wallen soil is very dark grayish brown channery sandy loam about 2 inches thick. The upper part of the subsoil, to a depth of about 5 inches, is light yellowish brown sandy loam. The middle part, to a depth of about 11 inches, is light olive brown very channery sandy loam. The lower part is brownish yellow very channery sandy loam.

Sandstone bedrock is at a depth of 24 inches. In a few areas, the subsoil is silt loam and rock fragments weathered from siltstone.

The Wallen soil has low natural fertility and low or moderate organic matter content. Permeability is moderately rapid, and the available water capacity is low. Surface runoff is medium, and the root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Gilpin soils on narrow divides and saddles. Small areas of Helechawa and Jefferson soils are on benches, side slopes, and the head slopes of drainageways. Individual areas of included soils commonly are less than 5 acres in size.

The major soils are mostly in woodland consisting of secondary growth hardwood forest. Much of the area is managed wildlife sanctuary.

These soils are unsuited to pasture, hay, and row crops because of steep slopes, depth to bedrock, rock outcrops, surface stones, and the hazard of erosion.

These soils are suited to woodland. Chestnut oak, black oak, scarlet oak, and Virginia pine are common trees. Eastern white pine, Virginia pine, shortleaf pine, loblolly pine, and black oak are suitable trees for planting.

The major management concerns for growing timber on these soils are an equipment limitation, plant competition, seedling mortality, and the hazard of erosion. Erosion is a hazard along haul roads and skid trails. This hazard can be reduced by establishing a grade of less than 10 percent along the roads and trails and by limiting the area of disturbance to 10 percent or less on a given site. Water bars, culverts, and gravel can protect permanent access roads. The shallow rooting depth of the Ramsey soil increases seedling mortality rates and windthrow. Stands in areas of the Ramsey soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely. Rock outcrops and very steep slopes restrict the use of wheeled and tracked equipment and may cause breakage and hinder yarding. In many areas, roads cannot be built because of cliffs.

The potential for woodland wildlife habitat on these soils is very poor to fair. The habitat can be maintained or improved by providing food, cover, water, nesting areas, and den sites. Brushy thickets can be established by clearing small areas in tracts of woodland. Food plots or areas of green browse can be established along logging roads and trails. Den trees should not be harvested. Brush piles or other nesting sites are needed.

These soils are unsuited to urban uses because of the steep slopes, the equipment limitation, and depth to bedrock.

The Alticrest, Ramsey, and Wallen soils are in capability subclass VIIe.

BcG—Berks-Caneyville complex, 50 to 120 percent slopes, very rocky

These moderately deep, well drained, very steep and extremely steep soils are on cool aspects of middle side slopes of the northwest-facing side of Pine Mountain near the border with Pike County in southern Letcher County. The Berks soil is on convex side slopes and nose slopes, and the Caneyville soil is intermingled with limestone rock outcrops on convex side slopes and in shallow coves. Elevations range from 1,680 to 2,440 feet. Two narrow bands totaling 201 acres are south of Jenkins on Pine Mountain and pinch off near Payne Gap.

Berks and similar soils make up about 50 percent of this map unit and Caneyville and similar soils about 20 percent. Rock outcrop makes up about 8 percent and minor soils the remaining 22 percent. These soils occur in a regular repeating pattern on the landscape but are too intricately mixed to be mapped separately at the scale selected for mapping.

Typically, the surface layer of the Berks soil is dark brown channery silt loam about 3 inches thick. The subsoil, to a depth of about 27 inches, is dark yellowish brown and yellowish brown very channery silt loam. Interbedded sandstone and siltstone bedrock is at a depth of about 27 inches. In some areas, the surface layer is thicker. In other areas, the subsoil has fewer rock fragments.

The Berks soil has low natural fertility and organic matter content. The available water capacity is low. Permeability is moderate or moderately rapid, and surface runoff is medium. The root zone is moderately deep, and root penetration is limited by rock fragments. Depth to interbedded sandstone and siltstone bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Caneyville soil is dark brown silt loam about 5 inches thick. The subsoil, to a depth of about 22 inches, is strong brown and reddish brown silty clay. It is underlain by limestone bedrock.

The Caneyville soil has medium natural fertility and moderate organic matter content. The available water capacity is low. Permeability is moderately slow, and surface runoff is very high. The root zone is moderately deep, and penetration by some roots is restricted by the clayey subsoil. Depth to limestone bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Gilpin soils on narrow benches and shoulder slopes. Soils that are shallow or deep to bedrock and soils that are yellower in the subsoil are intermingled with the Caneyville soil on similar landforms. In places, a shallow soil, weathered from shale or siltstone, is on some nose slopes and upper side slopes. Soils that are redder, have more clay in the subsoil, and are moderately acid to slightly alkaline are intermingled with the Berks soil on similar landforms. Rock outcrop, commonly limestone and siltstone cliffs, is tilted to the southeast and is 5 to 100 feet thick. In many places, large stones and boulders have broken from the rock outcrop and are scattered throughout the landscape or have filled drainageways. Most areas of included soils are less than 2 acres in size.

The major soils are mostly in woodland consisting of secondary growth hardwood forest and are unsuited to the production of row crops, hay, and pasture because of steep slopes, rock outcrop, surface stones, and the erosion hazard.

These soils are suited to woodland. White oak, black oak, scarlet oak, sugar maple, yellow-poplar, and hickory are some of the native trees. The understory is mainly sugar maple, red maple, greenbrier, flowering dogwood, white oak, eastern redcedar, sassafras, Virginia pine, sourwood, and hickory. Some trees preferred for planting in this map unit are eastern white pine, white oak, yellow-poplar, and northern red oak.

The erosion hazard, equipment limitation, and plant competition are concerns for woodland management in this map unit. Careful harvesting techniques can reduce disturbance of the surface layer. Steep slopes and rock outcrop restrict the use of wheeled and tracked equipment. Because the Caneyville soil is sticky and plastic when wet, trafficability is restricted. Steep skid trails and roads are subject to rilling and gullying unless protected by adequate water bars or plant cover, or both. Cable skidding generally is safer and disturbs the soil less. When openings are made in the canopy, uncontrolled invading brushy plants can delay natural regeneration.

The potential for woodland wildlife habitat on these soils is fair or good. The habitat can be maintained or improved by providing food, cover, water, nesting areas, and den sites. Brushy thickets can be established by clearing small areas in tracts of woodland. Food plots or areas of green browse can be established along logging roads and trails. Den trees should not be harvested. Brush piles or other nesting sites are needed.

These soils are unsuited to urban uses because of steep slopes, rock outcrops, surface stones, and slippage. Most areas are relatively inaccessible.

These Berks and Caneyville soils are in capability subclass VIIe.

CbF—Caneyville-Renox-Bledsoe complex, 50 to 80 percent slopes, extremely stony

These well drained, very steep soils are on the middle slopes of the northwest-facing side of Pine Mountain in southern Letcher County. The upper boundary of this map unit is a bench that weathered from clay shale. The lower boundary is a concave slope overlying siltstone and shale. The underlying bedrock in this map unit is dominantly limestone or calcareous shale. Mapped areas are two narrow bands that run the length of Pine Mountain but pinch off near Payne Gap, where they are covered with landslide debris. They range from 200 to about 2,000 acres in size.

Soil and slope patterns are complex because the geology is stratified and tilted. The upper part of this map unit weathered from the Pennington Formation and the lower part from the Newman Limestone. Separation of map units is difficult because slumping debris, consisting of loamy rubble, has covered these landforms to various depths. The moderately deep Caneyville soil is intermingled with limestone rock outcrop on convex side slopes. The very deep Renox soil is on linear side slopes and benches, generally above the Caneyville soil. The very deep Bledsoe soil formed in mixed colluvium weathered from sandstone, limestone, and shale and is in drainageways, on backslopes, and on benches, generally below limestone rock outcrop. Stones and flagstones cover about 5 to 15 percent of the surface area in this map unit.

Caneyville and similar soils make up about 30 percent of this map unit, Renox and similar soils about 30 percent, and Bledsoe and similar soils about 25 percent. Rock outcrop makes up about 5 percent and minor soils the remaining 10 percent. These soils form a regular repeating pattern on the landscape but could not be separated at the scale chosen for mapping.

Typically, the surface layer of the Caneyville soil is very dark grayish brown and brown silty clay loam about 8 inches thick. The upper part of the subsoil, to a depth of about 21 inches, is yellowish brown silty clay loam. The lower part, to a depth of about 36 inches, is strong brown and yellowish red clay. Limestone bedrock is at a depth of about 36 inches. Some areas have a thicker and darker surface horizon. In other areas, the subsoil has more rock fragments.

The Caneyville soil has medium natural fertility and

moderate organic matter content. The available water capacity is low. Permeability is moderately slow, and surface runoff is very high. The root zone is moderately deep, and penetration by some roots is restricted by the clayey subsoil. Depth to limestone bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Renox soil is dark yellowish brown silt loam about 5 inches thick. The upper part of the subsoil, to a depth of about 13 inches, is dark yellowish brown channery silt loam. The middle part, to a depth of about 30 inches, is strong brown channery silt loam and channery loam. The lower part of the subsoil, to a depth of about 60 inches, is yellowish brown silty clay loam and channery silty clay loam. The substratum is yellowish brown channery silty clay loam. In some areas, the subsoil is more acid. In a few places, depth to bedrock ranges from 40 to 60 inches.

The Renox soil has medium natural fertility and moderate organic matter content. The available water capacity is moderate. Permeability is moderate, and surface runoff is high. The root zone is deep and easily penetrated. Depth to soft shale or limestone bedrock is more than 60 inches.

Typically, the surface layer of the Bledsoe soil is brown silt loam about 12 inches thick. The upper part of the subsoil, to a depth of about 24 inches, is yellowish brown silty clay loam. The middle part, to a depth of about 43 inches, is strong brown silty clay. The lower part of the subsoil and the substratum are strong brown very flaggy clay. Depth to shale or limestone bedrock is greater than 80 inches. In some areas, the substratum is soft clay shale. In other areas, the substratum has fewer rock fragments.

The Bledsoe soil has medium natural fertility and moderate organic matter content. The available water capacity is moderate. Permeability is moderately slow in the subsoil and moderately slow or slow in the substratum. Surface runoff is very high. The root zone is deep and easily penetrated by roots.

Included in mapping are small areas of Cloverlick and Highsplint soils on narrow benches and in coves. Shelocta soils are on some upper side slopes and shoulder slopes. In places, shallow clayey soils are intermingled with the Caneyville soil in narrow strips between rock outcrops. Most areas of included soils are less than 2 acres in size.

The major soils are unsuited to production of row crops, hay, and pasture because of the steep slopes, surface stones, and the hazard of erosion.

These soils are suited to woodland. Sugar maple, yellow-poplar, American beech, pignut hickory, northern red oak, and white ash are common native trees. The understory is mainly redbud, eastern redcedar, sassafras, flowering dogwood, sourwood, spicebush, Christmas fern, and greenbrier. Some trees preferred for planting in this map unit are eastern white pine, northern red oak, yellow-poplar, white oak, and white ash.

The hazard of erosion, an equipment limitation, and plant competition are concerns for woodland management in this map unit. Careful harvesting techniques can reduce disturbance of the surface layer. Steep slopes and rock outcrops restrict the use of wheeled and tracked equipment. Because the Caneyville and Bledsoe soils are sticky and plastic when wet, trafficability is restricted. When openings are made in the canopy, uncontrolled invading brushy plants can delay natural regeneration.

The potential for woodland wildlife habitat on these soils is fair or good. The habitat can be maintained or improved by providing food, cover, water, nesting areas, and den sites. Brushy thickets can be established by clearing small areas in tracts of woodland. Food plots or areas of green browse can be established along logging roads and trails. Den trees should not be harvested. Brush piles or other nesting sites are needed.

These soils are unsuited to urban uses because of the steep slopes, rock outcrops, surface stones, and slippage. Most areas are relatively inaccessible.

These Caneyville, Renox, and Bledsoe soils are in capability subclass VIIe.

CgF—Cloverlick-Guyandotte-Highsplint complex, 35 to 80 percent slopes, very stony

These very deep, well drained, steep and very steep soils are on Black Mountain in southern Letcher County in areas with dominantly cool aspects. Elevations range from about 1,400 feet on the valley floor to about 3,500 feet near the mountain crest. The higher elevations receive more ice and snow during the winter than the lower elevations and may receive more rainfall during the summer. The Cloverlick soil is in coves, along drainageways, on benches, and on concave side slopes and footslopes. The Guyandotte soil is on head slopes, benches, and upper side slopes. The Highsplint soil is on benches and footslopes, dominantly at lower elevations where clearing was once extensive. Black Mountain is dissected by a dendritic pattern of small drainageways that start near the ridgetops and eventually join larger streams. The downward slope of the mountain is nearly

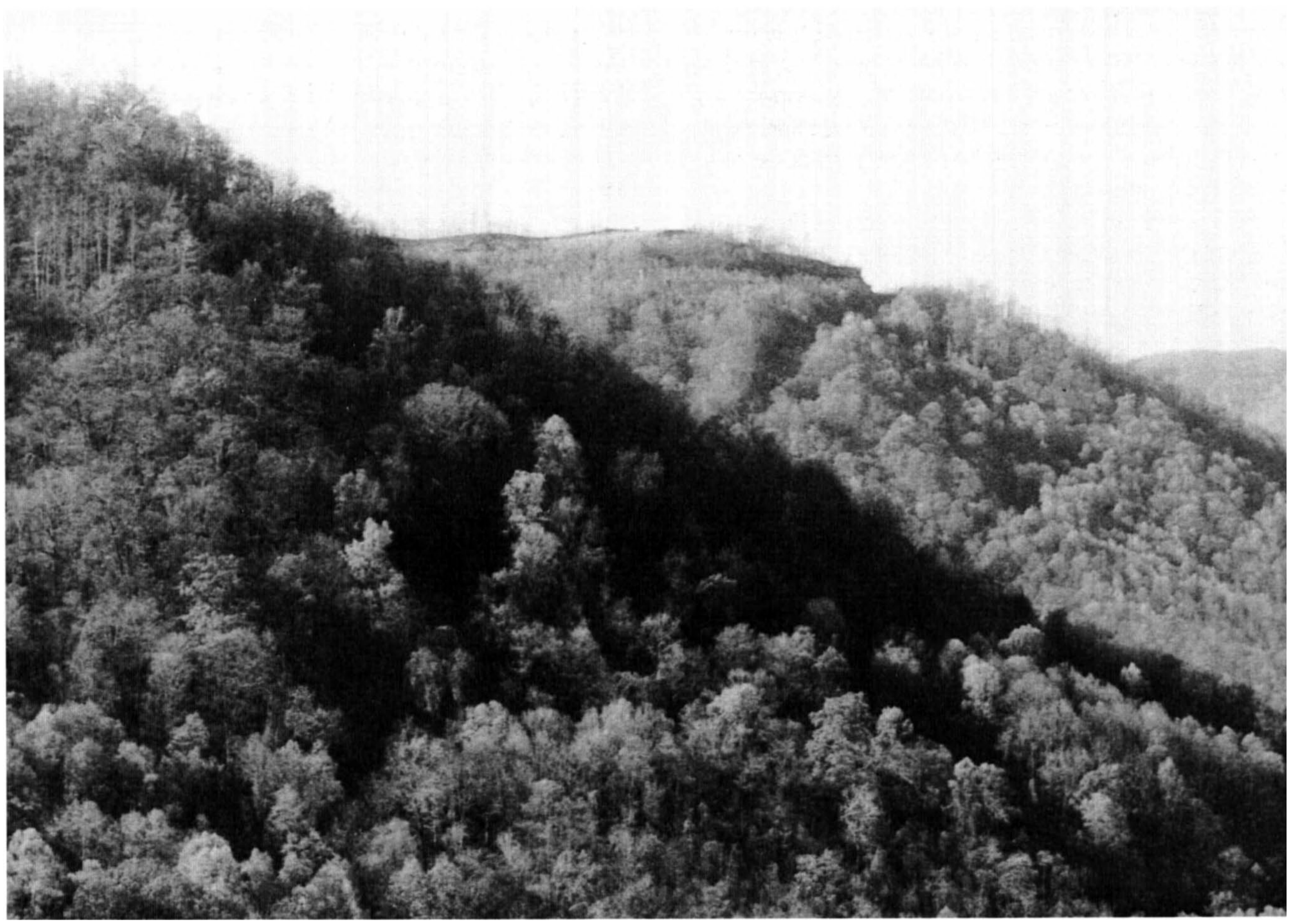

Figure 13.—A mountainside with cool aspect in an area of Cloverlick-Guyandotte-Highsplint complex, 35 to 80 percent slopes, very stony, near the head of Frank's Creek in Letcher County. The narrow ridgetop in the background is an area of Gilpin-Summers-Kimper complex, 20 to 55 percent slopes, very stony.

linear, except where broken by small cliffs or benches (fig. 13). Only a slight flattening of the slope occurs near the top and bottom of the mountain. Across the mountain, the slope is distinctly corrugated. Small streams in the grooves commonly begin near the mountain crest and run almost to the base of the mountain before joining other streams. The streams are about 300 to 600 feet apart. Areas between the streams are characterized by sharp-crested ribs that have smooth slopes. Stones and boulders generally cover about 0.1 to 15.0 percent of the surface. However, they cover as much as 70 percent of the surface in some ravines and areas below cliffs. Most areas are nearly rectangular and range from 50 to 2,500 acres in size.

Cloverlick and similar soils make up about 45 percent of this map unit, Guyandotte and similar soils about 20 percent, and Highsplint and similar soils about 20 percent. The remaining 15 percent is made up of minor soils. These soils are so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Cloverlick soil is very dark gray gravelly loam about 6 inches thick. The subsoil extends to a depth of about 70 inches. The upper part, to a depth of about 22 inches, is brown and yellowish brown gravelly loam. The middle part, to a depth of about 41 inches, is yellowish brown very gravelly loam. The lower part of the subsoil is yellowish brown very flaggy loam. Depth to bedrock ranges from 60 to 100 inches or more. In some areas, the subsoil has fewer rock fragments. In other areas, it contains more than 90 percent rock fragments.

The Cloverlick soil has low natural fertility despite having high organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is high. The root zone is very deep, but rock fragments often restrict root penetration.

Typically, the surface layer of the Guyandotte soil is very channery loam about 17 inches thick. This layer is very dark grayish brown in the upper part and dark brown in the lower part. The upper part of the subsoil, to a depth of about 40 inches, is dark yellowish brown very channery loam. The lower part, to a depth of about 61 inches, is yellowish brown very channery loam. Bedrock is at a depth of more than 72 inches. In some areas, the subsoil has fewer rock fragments. In other areas, it contains more than 90 percent rock fragments.

The Guyandotte soil has medium natural fertility despite having high organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is high. The root zone is very deep, but rock fragments often restrict penetration.

Typically, the surface layer of the Highsplint soil is very dark grayish brown very channery loam about 3 inches thick. The subsoil, to a depth of about 60 inches, is yellowish brown very channery loam. Depth to bedrock is greater than 72 inches. In some areas, the subsoil has fewer rock fragments. In other areas, it contains more than 90 percent rock fragments.

The Highsplint soil has low natural fertility and organic matter content. Permeability is moderate or moderately rapid. The available water capacity is low, and surface runoff is high. The root zone is very deep, but rock fragments often restrict penetration.

Included with these soils in mapping are areas of Dekalb and Shelocta soils on nose slopes and shoulder slopes. Kimper and Summers soils are on narrow benches and head slopes of coves. In places, a loamy soil that has a thick, dark surface layer more than 10 inches thick and has less than 35 percent coarse fragments in the subsoil is intermingled with the Cloverlick, Guyandotte, and Highsplint soils on similar landforms. Rock outcrop, in the form of ledges and cliffs, makes up less than 1 percent of the map unit. Individual areas of the minor soils usually are less than 5 acres in size.

The major soils are mainly in woodland consisting of secondary growth hardwoods with some scattered pine plantations.

These soils are unsuited to cultivated crops, hay, and pasture because of the steep slopes, rock outcrop, surface stones, and the hazard of erosion.

These soils are suited to woodland. Some of the more common tree species in coves and on the lower slopes are yellow-poplar, American basswood, black cherry, northern red oak, black locust, yellow buckeye, white oak, sugar maple, and red maple. In some areas, these species are mixed with white oak, chestnut oak, American beech, eastern hemlock, black cherry, and hickories. Understory plants include Virginia creeper, spicebush, ginseng, jewelweed, violets, wood nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, waterleaf, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, wood anemone, maidenhair fern, silvery gladefern, wood sorrel, wild geranium, and Solomons seal. Yellow-poplar, white ash, northern red oak, black walnut, shortleaf pine, and eastern white pine are preferred trees for planting.

The main concerns in managing timber on these soils are the hazard of erosion, equipment limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. The main limitation for timber harvesting is the steep and very steep slopes. Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction. Puddling can also occur. The use of cable yarding systems is safer, reduces damage to the soil, and helps maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of the steep slopes and surface stones.

These Cloverlick, Guyandotte, and Highsplint soils are in capability subclass VIIe.

CkF—Cloverlick-Kimper-Highsplint complex, 30 to 65 percent slopes, very stony

These very deep, well drained, steep and very steep soils are on hillsides with dominantly cool aspects, mostly in the Troublesome Creek and Kentucky River watersheds and on foothills at the bases of Black Mountain and Pine Mountain. The Cloverlick soil is in coves, along drainageways, and on concave footslopes. The Kimper soil is on linear side slopes, head slopes of coves, and narrow benches. The Highsplint soil is on upper side slopes and convex footslopes. The hillsides are dissected by a dendritic pattern of small drainageways that start near the ridgetops and eventually join larger streams. In most places, the small drainageways are about 300 to 600 feet apart and separated by narrow nose slopes. Stones and boulders generally cover about 5 percent of the surface. Because much of this complex was once cleared for cultivated crops and pasture, eroded spots and piles of stones are common. Most areas are wide bands. They range from 5 to about 600 acres in size.

Cloverlick and similar soils make up about 30

percent of this map unit, Kimper and similar soils about 30 percent, and Highsplint and similar soils about 20 percent. The remaining 20 percent is made up of minor soils. These soils occur in a regular repeating pattern on the landscape but are so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Cloverlick soil is very dark grayish brown channery loam about 9 inches thick. The upper part of the subsoil, to a depth of about 35 inches, is yellowish brown very channery loam. The middle part, to a depth of about 44 inches, is yellowish brown very flaggy loam. The lower part is yellowish brown very channery loam. Depth to bedrock ranges from 60 to 100 inches or more. In some places, the surface layer has more stones. In other places, the subsoil is silt loam.

The Cloverlick soil is low in natural fertility and high in organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is high. The root zone is very deep, but rock fragments often restrict penetration.

Typically, the surface layer of the Kimper soil is dark brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of about 10 inches, is brown silt loam. The middle part of the subsoil, to a depth of about 62 inches, is yellowish brown silt loam. The lower part is brown very channery loam. Bedrock is at a depth of more than 80 inches. In some areas, the subsoil has more clay. In other areas, the surface layer is thicker.

The Kimper soil has medium natural fertility and high organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is very deep and easily penetrated.

Typically, the surface layer of the Highsplint soil is brown channery silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is dark yellowish brown channery silt loam. The middle part, to a depth of about 55 inches, is yellowish brown very channery silt loam. The lower part of the subsoil is dark yellowish brown and yellowish brown very channery silt loam. Depth to bedrock is greater than 80 inches. In some areas, the surface layer is channery loam. In other areas, depth to bedrock ranges from 40 to 60 inches.

The Highsplint soil has low natural fertility and organic matter content. Permeability is moderate, the available water capacity is low, and surface runoff is high. The root zone is very deep, but rock fragments often restrict penetration.

Included in mapping are small areas of Gilpin and Summers soils on shoulder slopes and nose slopes between drainageways. Fedscreek and Shelocta soils are on slopes with warm aspects and make up about 5 percent of most areas. Grigsby soils and a soil with a gravelly surface layer and subsoil are along narrow drainageways. In places, a moderately deep soil with a thick, dark surface layer is on side slopes undercut by streams.

The major soils are mainly in woodland consisting of secondary growth hardwoods with some scattered pine plantations. They are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, and surface stones.

These soils are suited to woodland. Yellow-poplar, American basswood, northern red oak, black locust, cucumbertree, white oak, American beech, sugar maple, and red maple are native trees. Many abandoned fields have reverted to nearly pure stands of yellow-poplar. Understory species include Virginia creeper, spicebush, ginseng, jewelweed, violets, stinging nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, waterleaf, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, wood anemone, maidenhair fern, silvery gladefern, wood sorrel, wild geranium, and Solomons seal. Yellow-poplar, white oak, white ash, northern red oak, black walnut, and eastern white pine are preferred trees for planting.

The main concerns for managing timber on these soils are the hazard of erosion, an equipment limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. The main limitation for timber harvesting is steep slopes. Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction. Use of cable yarding systems is safer, reduces damage to the soil, and helps maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of steep slopes and surface stones.

These Cloverlick, Kimper, and Highsplint soils are in capability subclass VIIe.

CsF—Cloverlick-Shelocta-Kimper complex, 20 to 70 percent slopes, stony

These well drained, steep and very steep soils are on hillsides with cool aspects in northern and eastern Knott County and along the eastern edge of Letcher County. The very deep Cloverlick soil is in coves, along

drainageways, and on concave side slopes. The deep Shelocta soil is on linear side slopes and benches. The very deep Kimper soil is on head slopes of coves and narrow benches. The hillsides are dissected by a dendritic pattern of small drainageways that start near the ridgetops and eventually join larger streams. Stones and boulders are widely scattered throughout the map unit. Eroded spots and piles of stones are evidence of past clearing. Most areas are wide bands. They range from 5 to about 600 acres in size.

Cloverlick and similar soils make up about 30 percent of the map unit, Shelocta and similar soils about 30 percent, and Kimper soils about 20 percent. The remaining 20 percent is made up of minor soils. These soils occur in a regular repeating pattern on the landscape, but they are so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Cloverlick soil is very dark grayish brown channery loam about 9 inches thick. The upper part of the subsoil, to a depth of about 35 inches, is yellowish brown very channery loam. The middle part, to a depth of about 44 inches, is yellowish brown very flaggy loam. The lower part is yellowish brown very channery loam. Depth to bedrock ranges from 60 to 100 inches or more. In some places, the surface layer has more stones. In other places, the subsoil is silt loam.

The Cloverlick soil has low natural fertility despite having high organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is high. The root zone is very deep, but rock fragments often restrict penetration.

Typically, the surface layer of the Shelocta soil is brown silt loam about 3 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is yellowish brown silt loam. The middle part, to a depth of about 27 inches, is strong brown silt loam. The lower part of the subsoil is yellowish brown very channery silt loam. The substratum is yellowish brown very channery silt loam grading to soft siltstone at a depth of about 56 inches. Soft siltstone extends to a depth of more than 60 inches. In some areas, the subsoil is loam throughout the profile. In other areas, depth to bedrock is more than 80 inches.

The Shelocta soil has medium natural fertility and moderate organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is deep and easily penetrated.

Typically, the surface layer of the Kimper soil is dark brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of about 10 inches, is brown silt loam. The middle part of the subsoil, to a depth of about 62 inches, is yellowish brown silt loam. The lower part is brown very channery loam. Bedrock is at a depth of more than 80 inches. In some areas, the surface layer is thicker. In other areas, the subsoil has more clay.

The Kimper soil has medium natural fertility and high organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is very deep and easily penetrated.

Included in mapping are areas of Dekalb, Gilpin, and Marrowbone soils on shoulder slopes and nose slopes. Fedscreek, Handshoe, and Highsplint soils are in coves and on benches with warm aspects. Grigsby and Holly soils are along narrow drainageways. In places, a moderately deep soil, weathered from shale, is on side slopes undercut by streams. Individual areas of the minor soils commonly are less than 5 acres in size.

The major soils are mainly in woodland consisting of secondary growth hardwoods and scattered pine plantations. They are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, and surface stones.

These soils are suited to woodland. Yellow-poplar, American basswood, American beech, northern red oak, cucumbertree, white oak, northern red oak, sugar maple, and red maple are native trees. Many abandoned fields have reverted to nearly pure stands of yellow-poplar. Some of the fields have been planted to eastern white pine or other pine species. Understory plants are luxuriant and include flowering dogwood, American hornbeam, Virginia creeper, spicebush, ginseng, jewelweed, violets, stinging nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, waterleaf, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, wood anemone, maidenhair fern, silvery gladefern, wood sorrel, wild geranium, and Solomons seal. Yellow-poplar, white ash, white oak, northern red oak, black walnut, shortleaf pine, and eastern white pine are preferred trees for planting.

The main concerns for managing timber on these soils are the hazard of erosion, equipment limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless protected by adequate water bars or plant cover, or both. The main limitation for harvesting timber is the steep and very steep slopes. Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction. Use of cable yarding systems is safer, reduces damage to the soil, and helps maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of steep slopes and surface stones.

These Cloverlick, Shelocta, and Kimper soils are in capability subclass VIIe.

DAM—Dam, large earthen

This map unit consists of water impoundment structures, or earthen dams, scattered throughout the survey area. These dams were constructed of earthen materials consisting of soil and rock and contain varying amounts of sand, silt, clay, and rock fragments. The impounded areas consist of ponds and lakes used primarily for recreation, flood control, and water supply. Other uses include control of mine runoff sedimentation and containment of refuse water. In addition to the dam structure, emergency spillways, parking areas, and roads located on or near the dam are also included in this map unit. Map unit delineations are commonly triangular and are about 2 to 3 acres in size.

Reclaimed areas support grasses, forbs, or small trees. The spreading and smoothing of native soil material is common in these areas. The main limitations affecting the establishment of vegetation are acidity and low fertility. In places, a high content of rock fragments in the surface layer or steep slopes are limitations. Applying lime and fertilizer, mulching, and selecting species that are suited to man-made soil material can help establish better plant cover.

This map unit is not assigned a land capability classification.

DgF—Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very rocky

These moderately deep, well drained, steep and very steep soils are on ridgetops in northern and eastern Knott County and along the eastern edge of Letcher County. The Dekalb soil is on sharp crests, nose slopes, and the head slopes of some drainageways. The Gilpin soil is on saddles and rounded summits. The Marrowbone soil is on nose slopes, sharp crests, and upper side slopes. Slopes are dominantly linear or convex. Stones and boulders are widely scattered throughout the map unit. Most areas are long and winding narrow bands. They range from 50 to about 500 acres in size.

Dekalb and similar soils make up about 35 percent of the map unit, Gilpin and similar soils about 25 percent, and Marrowbone and similar soils about 15 percent. Rock outcrop makes up about 5 percent (fig. 14), and the remaining 20 percent is minor soils. However, many areas have been cut by surface mining and not all of the soils may occur in the smaller delineations. These soils occur in a regular repeating pattern on the landscape but could not be separated at the scale chosen for mapping.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 2 inches thick. The upper part of the subsoil, to a depth of about 10 inches, is yellowish brown channery sandy loam. The lower part is yellowish brown very channery sandy loam. Fractured sandstone bedrock is at a depth of about 25 inches. In some areas, the surface layer is loam. In other areas, the subsoil is thicker.

The Dekalb soil has low natural fertility and organic matter content. Permeability is rapid, and the available water capacity is low. Surface runoff is low. The root zone is moderately deep, but rock fragments limit penetration. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Gilpin soil is brown loam about 2 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is light yellowish brown silt loam. The lower part of the subsoil is yellowish brown silty clay loam and channery silt loam. The substratum is mottled yellowish brown very channery silt loam. Rippable siltstone is at a depth of about 34 inches. In some areas, the surface layer is silt loam. In other areas, the subsoil has less sand and few rock fragments.

The Gilpin soil has low natural fertility and organic matter content. Permeability and the available water capacity are moderate. Surface runoff is high. The root zone is moderately deep and easily penetrated. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Marrowbone soil is very dark grayish brown fine sandy loam about 2 inches thick. The subsoil, to a depth of about 31 inches, is yellowish brown and brownish yellow fine sandy loam and sandy loam. The substratum is brownish yellow sandy loam. Sandstone bedrock is at a depth of about 37 inches. In some areas, the surface layer is loam. In other areas, the subsoil has more rock fragments.

The Marrowbone soil has low natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is low. Surface runoff is medium. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping on upper side slopes and shoulder slopes are small areas of Fedscreek and Shelocta soils. A moderately deep, clayey soil is on a few broad saddles. In places, a shallow loamy soil, weathered from siltstone, is on narrow saddles and

Figure 14.—Sandstone rock outcrop is common along narrow ridgetops in areas of Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very rocky.

nose slopes. The minor soils do not occur in all areas and commonly are less than 5 acres in size.

The major soils are mainly in woodland made up of secondary growth hardwoods and isolated stands of native pitch pine. They are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, surface stones, and rock outcrop.

These soils are suited to woodland. White oak, black oak, chestnut oak, scarlet oak, pignut hickory, red maple, and pitch pine are native trees. Isolated stands of northern red oak, sugar maple, pignut hickory, and yellow-poplar are on lower, moister sites. Eastern white pine, shortleaf pine, and black oak are the preferred trees for planting on these soils.

The main concerns in managing timber on these soils are the severe hazard of erosion and the equipment limitation. Steep skid trails and roads are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. Steep slopes restrict the use of wheeled and tracked equipment on skid trails. Cable yarding is safer and disturbs the soil less. Seedling mortality is generally moderate during periods of adequate rainfall but can be severe on slopes with warm aspects during dry summers. Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

The potential for woodland wildlife habitat on these soils is poor or fair. The habitat can be maintained or improved by providing food, cover, water, nesting areas, and den sites. Brushy thickets can be established by clearing small areas in tracts of woodland. Food plots or areas of green browse can be established along logging roads and trails. Den trees should not be harvested. Brush piles or other nesting sites should be preserved.

These soils are unsuited to urban uses because of steep slopes, depth to bedrock, and rock outcrop.

These Dekalb, Gilpin, and Marrowbone soils are in capability subclass VIIe.

DrF—Dekalb-Gilpin-Rayne complex, 25 to 65 percent slopes, very rocky

These well drained, steep and very steep soils are on ridgetops in southern Knott County and western Letcher County. The moderately deep Dekalb soil is on sharp crests, nose slopes, and the head slopes of drainageways. The moderately deep Gilpin soil is on shoulder slopes, narrow saddles, and rounded summits. The deep Rayne soil is on broad saddles and a few narrow benches. Slopes are dominantly linear or convex. Stones and boulders are widely scattered throughout the map unit. Most areas are long and winding narrow bands. They range from 50 to about 500 acres in size.

Dekalb and similar soils make up about 40 percent of the map unit, Gilpin and similar soils about 20 percent, and Rayne and similar soils about 20 percent. Rock outcrop makes up about 5 percent and minor soils the remaining 15 percent. Surface mining has dissected many of the delineations, and not all of the soils may occur in the smaller areas. These soils occur in a regular repeating pattern on the landscape but could not be separated at the scale chosen for mapping.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 2 inches thick. The upper part of the subsoil, to a depth of about 10 inches, is yellowish brown channery sandy loam. The lower part is yellowish brown very channery sandy loam. Fractured sandstone bedrock is at a depth of about 25 inches. In some areas, the surface layer is channery loam. In other areas, rock fragments are dominantly siltstone.

The Dekalb soil has low natural fertility and organic matter content. Permeability is rapid, and the available water capacity is low. Surface runoff is low. The root zone is moderately deep, but rock fragments limit penetration. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Gilpin soil is brown loam about 2 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is light yellowish brown silt loam. The lower part is yellowish brown silty clay loam and channery silt loam. The substratum is mottled yellowish brown very channery silt loam. Rippable siltstone is at a depth of about 34 inches. In some areas, the surface layer is silt loam. In other areas, the subsoil is silty clay with moderately slow permeability.

The Gilpin soil has low natural fertility and organic matter content. Permeability and the available water capacity are moderate. Surface runoff is high. The root zone is moderately deep and easily penetrated by roots. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Rayne soil is dark brown silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is brownish yellow silt loam. The middle part of the subsoil, to a depth of about 24 inches, is brownish yellow silty clay loam. The lower part of the subsoil is strong brown and light gray silty clay loam. The substratum is light weathered siltstone that grades to hard siltstone bedrock at a depth of about 46 inches. In some areas, the surface layer is loam. In other areas, the subsoil is clay loam with moderately slow permeability.

The Rayne soil has medium natural fertility and low organic matter content. Permeability and the available water capacity are moderate. Surface runoff is high. The root zone is deep and easily penetrated. Depth to bedrock ranges from 40 to 60 inches.

Included in mapping on upper side slopes and the head slopes of drainageways are small areas of Fedscreek, Jefferson, and Summers soils. Marrowbone and Ramsey soils are on nose slopes and narrow saddles. In places, shallow loamy soils, weathered from siltstone, are on shoulder slopes. The minor soils do not occur in all areas and commonly are less than 5 acres in size.

The major soils are mainly in woodland made up of secondary growth hardwoods and isolated stands of native pitch pine. They are unsuited to cultivated crops, hay, and pasture because of steep and very steep slopes, the hazard of erosion, surface stones, and rock outcrop.

These soils are suited to woodland. Chestnut oak, black oak, scarlet oak, pignut hickory, red maple, and pitch pine are native trees. Eastern white pine, shortleaf pine, and black oak are the preferred trees for planting on these soils.

The main concerns in managing timber on these soils are the hazard of erosion, limitations for equipment use, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless protected by water bars or plant cover, or both. Steep slopes restrict the use of wheeled and tracked equipment. Cable yarding is safer and disturbs the soil less. On warm aspects, seedling mortality can be severe in summer because of inadequate soil moisture. Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

The potential for woodland wildlife habitat on these soils is poor or fair. The habitat can be maintained or

improved by providing food, cover, water, nesting areas, and den sites. Brushy thickets can be established by clearing small areas in tracts of woodland. Food plots or areas of green browse can be established along logging roads and trails. Den trees should not be harvested. Brush piles or other nesting sites should be preserved.

These soils are unsuited to urban uses because of steep slopes, surface stones, depth to bedrock, and rock outcrop.

These Dekalb, Gilpin, and Rayne soils are in capability subclass VIIe.

FaF—Fedscreek-Shelocta-Handshoe complex, 30 to 80 percent slopes, very stony

These steep and very steep, well drained soils are on hillsides in northeastern Knott County and along the eastern edge of Letcher County. Slopes are complex. The very deep Fedscreek soil is on linear side slopes, benches, and convex footslopes. The deep Shelocta soil is in coves, on benches, and on concave footslopes. The very deep Handshoe soil is on head slopes of drainageways and nose slopes. These landforms are dissected by a dendritic pattern of small drainageways that begin near the ridgetops and empty into small streams on narrow flood plains. Stones and boulders generally cover about 5 percent of the surface. Most areas are wide bands separated from slopes with cool aspects. They range from 50 to about 1,200 acres in size.

Fedscreek and similar soils make up about 30 percent of the map unit, Shelocta and similar soils about 30 percent, and Handshoe and similar soils about 25 percent. The remaining 15 percent is minor soils. The soil patterns are influenced by colluvium that moved downslope from higher positions. The materials vary in texture because they weathered from interbedded sandstone, shale, siltstone, and coal. These soils occur in a regular repeating pattern on the landscape but could not be separated at the scale selected for mapping.

Typically, the surface layer of the Fedscreek soil is brown sandy loam about 3 inches thick. The upper part of the subsoil, to a depth of about 12 inches, is dark yellowish brown sandy loam. The middle part, to a depth of about 19 inches, is brownish yellow sandy loam. The lower part of the subsoil is yellowish brown and strong brown sandy loam. Sandstone bedrock is at a depth of 61 inches. In some areas, the surface layer is loam. In other areas, bedrock ranges from 40 to 60 inches.

The Fedscreek soil has medium natural fertility and moderate organic matter content. Permeability is moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The root zone is very deep and easily penetrated.

Typically, the surface layer of the Shelocta soil is brown silt loam about 3 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is yellowish brown silt loam. The middle part, to a depth of about 27 inches, is strong brown silt loam. The lower part of the subsoil is yellowish brown very channery silt loam. The substratum is yellowish brown very channery silt loam grading to soft siltstone at a depth of about 56 inches. Soft siltstone extends to a depth of more than 60 inches. In some areas, the subsoil is loam throughout. In other areas, depth to bedrock is more than 60 inches.

The Shelocta soil has medium natural fertility and moderate organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is deep and easily penetrated.

Typically, the surface layer of the Handshoe soil is dark grayish brown very channery loam about 7 inches thick. The upper part of the subsoil, to a depth of about 14 inches, is yellowish brown very channery loam. The middle part, to a depth of about 32 inches, is yellowish brown very channery sandy loam. The lower part is yellowish brown channery and very channery sandy loam. Sandstone bedrock is at a depth of more than 80 inches. In some areas, the surface layer is thicker and darker. In other areas, the substratum is very firm and brittle loam or clay loam.

The Handshoe soil has low natural fertility and organic matter content. Permeability is moderately rapid. Surface runoff is medium. The root zone is very deep, but rock fragments often limit penetration. Depth to bedrock is greater than 60 inches.

Included with these soils in mapping on upper side slopes and nose slopes are small areas of Berks, Gilpin, and Marrowbone soils. Kimper soils are on lower slopes with cool aspects. In places, Highsplint soils are intermingled with the major soils on similar landforms. Individual areas of the minor soils commonly are less than 2 acres in size.

The major soils are mainly in woodland made up of secondary growth hardwoods. A few footslopes are cleared for pasture and gardening (fig. 15).

These soils are suited to woodland. White oak, black oak, scarlet oak, mockernut hickory, red maple, shortleaf pine, and pitch pine are native trees. Isolated stands of northern red oak, sugar maple, and yellow-poplar are on lower, moister sites. Understory plants are luxuriant and include tick trefoil, pussytoes,

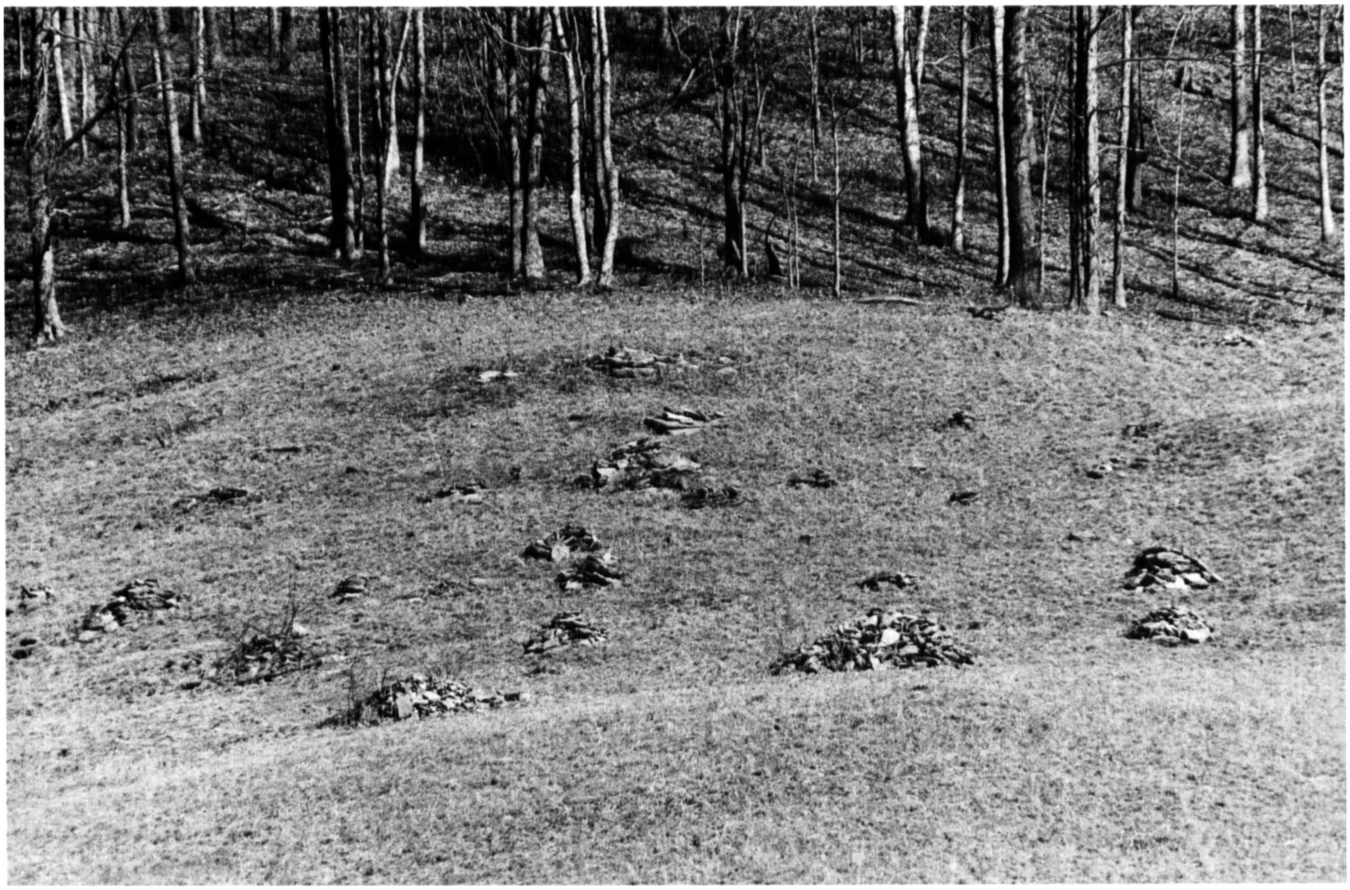

Figure 15.—An area of Fedscreek-Shelocta-Handshoe complex, 30 to 80 percent slopes, very stony, where surface stones were once collected and placed in piles to allow cultivation of corn for livestock. The footslope in the foreground is now pastured. The steeper slopes in the background are returning to woodland.

sedum, lousewart, flowering dogwood, redbud, mapleleaf viburnum, gall-of-the-earth, panicum, early saxifrage, azalea, greenbrier, blackgum, wild grape, and horsebalm. Shortleaf pine, black oak, and white oak are the preferred trees for planting on these soils.

The main concerns in managing timber on these soils are the hazard of erosion, the equipment limitation, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. Steep slopes restrict the use of wheeled and tracked equipment on skid trails. Cable yarding is safer and disturbs the soil less. Seedling mortality is severe in summer because of inadequate moisture. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of the steep slopes and surface stones.

These Fedscreek, Shelocta, and Handshoe soils are in capability subclass VIIe.

FkE—Fiveblock and Kaymine soils, 0 to 30 percent slopes, stony

These very deep, somewhat excessively drained and well drained, nearly level to steep soils are on ridgetops throughout the survey area. They formed from a mixture of soil material and material weathered from the underlying bedrock in areas that have been surface mined for coal. Slopes are linear or convex and dissected by diversion ditches that empty into small ponds. Stones and boulders are widely scattered throughout the map unit. Most mapped areas are irregular bands or elongated ovals. They range from 5 to about 200 acres in size.

In a typical area, about 40 percent is Fiveblock soil and 40 percent is Kaymine soil. The remaining 20 percent is minor soils, roads, and ponds. The pattern and proportion of these soils are not generally uniform. Individual areas may contain one or both soils. This variability is due to differences in parent material and

reclamation practices. Individual areas of each soil are generally large enough to be mapped separately, but because of the present and predicted uses, the soils were mapped as an undifferentiated unit.

Typically, the surface layer of the Fiveblock soil is brown and light yellowish brown channery sandy loam about 14 inches thick. The underlying substratum is brown, grayish brown, dark gray, and gray very channery sandy loam to a depth of more than 65 inches. Bedrock is at a depth of more than 65 inches. In places, the subsoil is very strongly acid.

Typically, the surface layer of the Kaymine soil is grayish brown channery silt loam about 4 inches thick. The underlying substratum is brown and dark gray very channery and very flaggy silt loam to a depth of more than 65 inches. The content of sandstone, siltstone, and shale channers ranges from 20 to 50 percent. Depth to bedrock is greater than 80 inches.

These soils have low natural fertility and very low organic matter content. Permeability is moderate or moderately rapid in the Kaymine soil and moderately rapid or rapid in the Fiveblock soil. These soils have low available water capacity, and surface runoff is low or medium. The root zone is very deep, but rock fragments and compaction hinder penetration. Depth to bedrock ranges from 5 to 20 feet.

Included in mapping are small areas of Itmann and Fairpoint soils on ridgetops. Mine soils that are more acid in the substratum are intermingled with the major soils on similar landforms. Coal storage or processing areas, roads, small ponds, diversions, and sediment-control structures are common throughout mapped areas.

Most areas of the major soils are idle, having been reclaimed to production of grasses, legumes, or young trees. A few areas are being used for pasture, but little management has been applied, except fencing. Most areas have been limed and fertilized at least once during reclamation.

These soils are unsuited to cultivated crops. Rock fragments interfere with tillage, and the lack of moisture during dry seasons makes high yields unlikely. These soils are suited to pasture and hay. Most grasses and legumes grown in the survey area will grow on these soils. Surface stones restrict the use of tillage implements, and settling is irregular in places. Vegetative treatment that provides a quick and permanent cover helps to control erosion. In seeding these areas, the spoil must be graded smooth enough so that equipment can be used in planting, harvesting, and maintaining vegetation.

These soils are suited to woodland. Eastern white pine, black locust, and autumn olive are commonly planted for reclamation. Good-quality planting stock is required for maximum survival rates and growth. Seedling mortality is a management concern on these soils.

Areas that are graded, seeded, and planted to either herbaceous or woody plants have good potential for wildlife food or cover. Any planting that provides adequate vegetative cover and controls erosion is beneficial to wildlife. Strips of herbaceous plants and trees are more attractive than solid plantings. Good plant cover requires maintenance, including applications of fertilizer and reseeding or the replanting of spots where vegetation failed to become established.

These soils have moderate or severe limitations for most urban uses. The soils on gentle slopes are suited to use for building sites. Foundations need extra reinforcement in areas of these soils because they are subject to differential settling for some years after mining.

These Fiveblock and Kaymine soils are in capability subclass VIs.

GID—Gilpin-Shelocta complex, 12 to 25 percent slopes

These well drained, moderately steep and steep soils are on hillsides throughout the survey area. The moderately deep Gilpin soil is on convex nose slopes, shoulder slopes, and upper side slopes. The deep Shelocta soil is on concave footslopes and lower side slopes. Most areas are irregular in shape or in narrow bands. Areas range from 5 to about 75 acres in size.

Gilpin soil makes up about 40 percent of this map unit and Shelocta soil about 35 percent. The remaining 25 percent is made up of minor soils. These soils occur in a repeating pattern on the landscape but are so closely intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Gilpin soil is brown loam about 2 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is light yellowish brown silt loam. The lower part of the subsoil is yellowish brown silty clay loam and channery silt loam. The substratum is mottled yellowish brown very channery silt loam. Rippable siltstone is at a depth of about 34 inches. In some areas, the surface layer is loam. In other areas, the subsoil has more rock fragments.

The Gilpin soil has low natural fertility and organic matter content. Permeability and the available water

capacity are moderate. Surface runoff is medium. The root zone is moderately deep and easily penetrated. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Shelocta soil is brown silt loam about 3 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is yellowish brown silt loam. The middle part, to a depth of about 27 inches, is strong brown silt loam. The lower part of the subsoil is yellowish brown very channery silt loam. The substratum is yellowish brown very channery silt loam grading to soft siltstone at a depth of about 56 inches. Soft siltstone extends to a depth of more than 60 inches. In some areas, the subsoil is loam throughout. In other areas, the surface layer is more than 10 inches thick.

The Shelocta soil has medium natural fertility and moderate organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is medium. The root zone is deep and easily penetrated.

Included in mapping are small areas of Alticrest, Dekalb, Marrowbone, and Rayne soils on shoulder slopes, nose slopes, and narrow saddles. Fedscreek and Handshoe soils are on head slopes and along some narrow drainageways. Urban land, consisting mainly of roads and residences, is common on hillsides above major streams. Individual areas of the minor soils generally are less than 5 acres in size.

The major soils are mainly in woodland, but some areas on nose slopes and benches are used for the production of hay and pasture or for homesites.

These soils are poorly suited to row crops. Erosion is a limitation if conventional tillage is used. These soils are suited to hay and pasture. Moderate yields can be obtained if the soil is properly managed. The moderate depth of the root zone and the lack of moisture in dry seasons limit production. Plants that produce adequate forage and provide satisfactory ground cover should be selected. Applying lime and fertilizer, using proper stocking rates, rotating grazing, and controlling weeds are important practices for producing high-quality hay and forage.

These soils are suited to woodland. Eastern white pine, white oak, northern red oak, and shortleaf pine are the most suitable trees for planting. The hazard of erosion, the equipment limitation, and plant competition are management concerns.

These soils are poorly suited to most urban uses. Depth to bedrock and the slope are limitations for septic systems and dwellings with basements in areas of the Gilpin soil. Special design and proper installation may overcome these limitations.

These Gilpin and Shelocta soils are in capability subclass IVe.

GmF—Gilpin-Summers-Kimper complex, 20 to 55 percent slopes, very stony

These well drained, steep and very steep soils are on the ridgetop of Black Mountain in Letcher County. Elevations range from about 3,000 to 3,800 feet near the mountain crest, and most areas have cool aspects. The moderately deep Gilpin and Summers soils are on nose slopes, linear side slopes, and saddles on the widest and flattest areas of the ridgetop. The deep Kimper soil is on upper side slopes, shoulder slopes, and head slopes of drainageways. Stones and boulders generally cover about 5 percent of the surface area. Because this map unit has been heavily logged, eroded spots are common. The area is in the shape of a narrow band that runs the length of Black Mountain. Most of this area is along the border with Virginia.

Gilpin and similar soils make up about 30 percent of the map unit, Summers and similar soils about 25 percent, and Kimper and similar soils about 20 percent. The remaining 25 percent is made up of minor soils. These soils occur in a regular repeating pattern on the landscape but are so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Gilpin soil is brown loam about 2 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is light yellowish brown silt loam. The lower part of the subsoil is yellowish brown silty clay loam and channery silt loam. The substratum is mottled yellowish brown very channery silt loam. Rippable siltstone is at a depth of about 34 inches. In some areas, the subsoil is silt loam throughout. In other areas, the subsoil has less clay and grades to soft shale at a depth of about 40 inches.

The Gilpin soil has low natural fertility and organic matter content. Permeability and the available water capacity are moderate. Surface runoff is high. The root zone is moderately deep and easily penetrated. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Summers soil is very dark gray and dark brown very flaggy loam about 13 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is brown very flaggy loam. The lower part is dark yellowish brown very channery loam. The substratum is yellowish brown very flaggy loam. Fractured sandstone bedrock is at a depth of about 35 inches. In some areas, the surface layer is eroded. In other areas, the subsoil has fewer rock fragments. In a few places, the subsoil is more than 90 percent rock fragments.

The Summers soil has low natural fertility despite having high organic matter content. Permeability is moderately rapid, and the available water capacity is low. Surface runoff is medium. The root zone is

moderately deep, but rock fragments often interfere with penetration. Depth to bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Kimper soil is very dark grayish brown silt loam about 7 inches thick. The subsoil, to a depth of about 48 inches, is yellowish brown channery silt loam. Siltstone bedrock is at a depth of about 48 inches. In some areas, the surface layer is lighter in color. In other areas, it is thicker.

The Kimper soil has medium natural fertility and high organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is very deep and easily penetrated. Depth to bedrock ranges from 40 to 60 inches.

Included in mapping are small areas of Cloverlick and Guyandotte soils on upper side slopes. Dekalb, Highsplint, Marrowbone, and Shelocta soils are on shoulder slopes and nose slopes in areas with warm aspects. In places, Ramsey soils and shallow soils that have a dark surface layer make up about 5 percent of mapped areas. Most individual areas of the minor soils are less than 5 acres in size.

The major soils are mainly in woodland consisting of secondary growth hardwoods. They are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, and surface stones.

These soils are suited to woodland. Black cherry, yellow-poplar, American basswood, sweet birch, northern red oak, black locust, cucumbertree, white oak, sugar maple, red maple, and striped maple are native trees. Understory plants include Virginia creeper, spicebush, ginseng, jewelweed, violets, stinging nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, waterleaf, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, rue anemone, maidenhair fern, silvery gladefern, wood sorrel, wild geranium, and Solomons seal. Black cherry, white oak, northern red oak, black walnut, shortleaf pine, and eastern white pine are preferred trees for planting.

The main concerns in managing timber on these soils are the hazard of erosion, equipment limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. The main limitation for timber harvesting is steep slopes. Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction. Puddling can also occur. Use of cable yarding systems is safer, reduces damage to the soil, and helps maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of steep slopes and surface stones.

These Gilpin, Summers, and Kimper soils are in capability subclass VIIe.

Gr—Grigsby sandy loam, occasionally flooded

This very deep, well drained, nearly level and gently sloping soil is on flood plains along the Cumberland and Kentucky Rivers and major streams throughout the survey area. Slopes are smooth or slightly convex and range from 0 to 3 percent. Most areas are in the shape of narrow bands that commonly include whole valley floors. They range from 5 to about 75 acres in size.

Typically, the surface layer of the Grigsby soil is brown sandy loam about 9 inches thick. The upper part of the subsoil, to a depth of about 44 inches, is brown and dark yellowish brown sandy loam. The lower part of the subsoil, to a depth of about 52 inches, is light yellowish brown sandy loam. The substratum is light yellowish brown loamy sand. Bedrock is commonly at a depth of more than 80 inches. On streambanks and a few low convex mounds, the surface layer is loamy sand overwash and thin strata of sand and loam occur throughout the profile. In other areas, the texture is loam or silt loam throughout the profile.

The Grigsby soil has high natural fertility and moderate organic matter content. Permeability is moderately rapid, the available water capacity is high, and surface runoff is very low. A seasonal high water table is at a depth of about 42 inches during winter and early spring. This soil is subject to occasional flooding; however, it is generally not flooded during the growing season (fig. 16). This soil is easy to till and may be worked throughout a wide range in moisture content. The root zone is very deep and easily penetrated.

Included in mapping are small areas of Rowdy soils on low stream terraces and Holly soils in seep spots. Also, small areas of Udorthents have been created by filling and grading the flood plain. A few areas of soils that are less than 40 inches deep to bedrock are along some narrow drainageways. These included soils make up about 15 percent of the map unit, but most individual areas of these soils are less than 3 acres in size.

The Grigsby soil is used mainly for growing hay, pasture, and corn.

This soil is suited to row crops, hay, and pasture. High yields can be obtained if the soil is properly managed. Flooding of short duration seldom damages grasses and legumes. Pasture renovation should be frequent enough to maintain the desired plants.

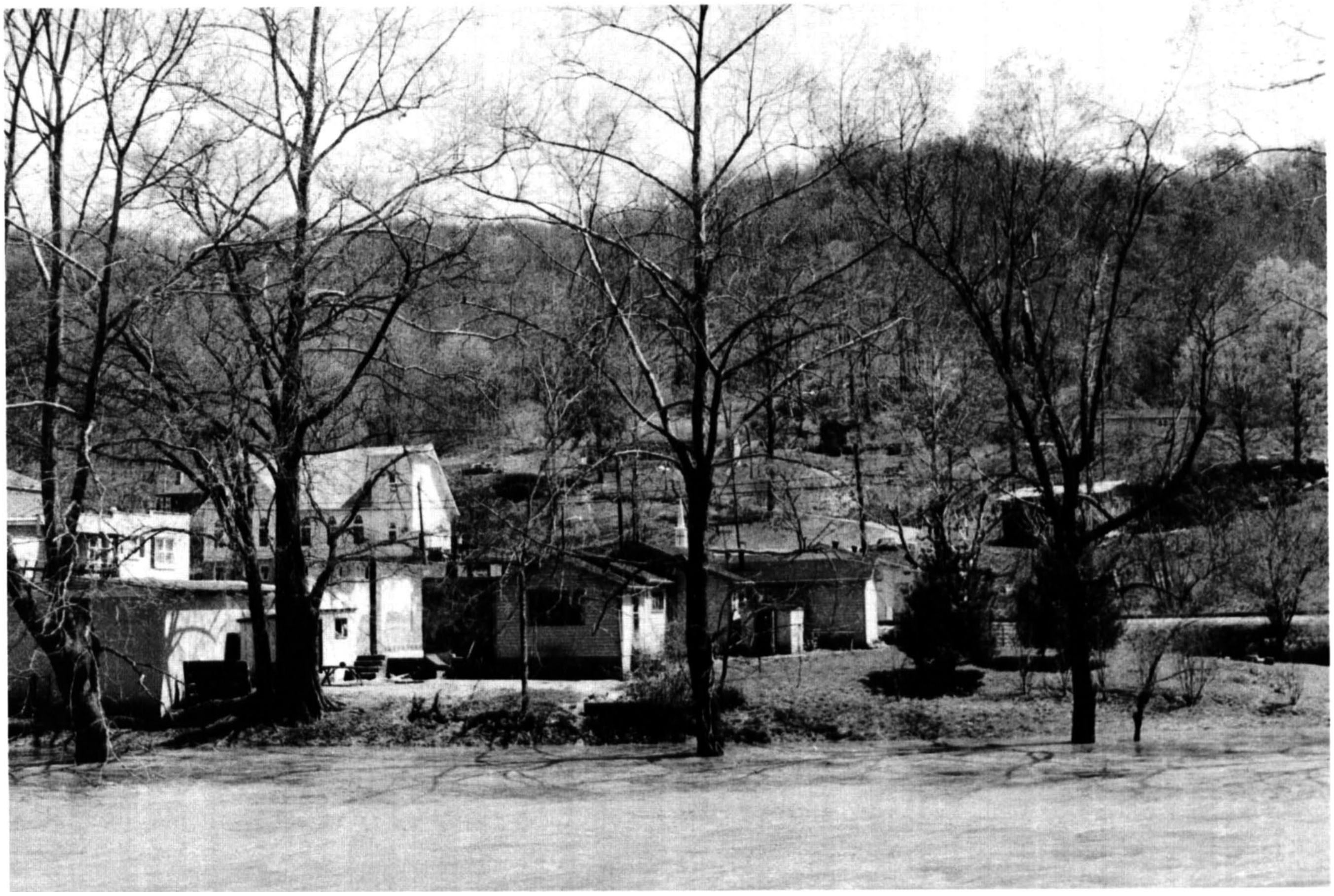

Figure 16.—Flooding is a management concern in areas of Grigsby sandy loam, occasionally flooded. These areas are often used as sites for lawns, gardens, and pasture along the Kentucky River and major streams throughout the survey area. The higher ground is an area of Urban land-Udorthents-Grigsby complex, 0 to 6 percent slopes, rarely flooded.

Applying lime and fertilizer, using proper stocking rates and rotational grazing, and controlling weeds are important practices. The Grigsby soil can be cropped continuously if management practices that maintain soil fertility and organic matter content are used.

This soil is suited to woodland, although most of the map unit has been cleared. Yellow-poplar, eastern white pine, shortleaf pine, white oak, white ash, and black walnut are suitable trees for planting. Plant competition is a management concern.

This soil is unsuited to most urban development because of flooding. However, special designs and careful site selection can overcome this hazard.

This soil is in capability subclass IIw.

GuB—Grigsby-Urban land complex, 0 to 6 percent slopes, occasionally flooded

These very deep, nearly level to sloping, well drained areas of Grigsby soil and Urban land are on flood plains along the Cumberland and Kentucky Rivers and major streams throughout the survey area (fig. 17). Slopes are slightly convex or smooth. Most areas are in the shape of long narrow bands, commonly making up whole valley floors. They range from 5 to about 75 acres in size.

Typically, Grigsby soil makes up about 65 percent of this map unit and Urban land about 20 percent. Included minor soils make up the remaining 15 percent. These areas of Grigsby soil and Urban land are so closely intermingled that they could not be separated at the scale chosen for mapping.

Typically, the surface layer of the Grigsby soil is brown sandy loam about 9 inches thick. The upper part of the subsoil, to a depth of about 44 inches, is brown and dark yellowish brown sandy loam. The lower part of the subsoil, to a depth of about 52 inches, is light yellowish brown sandy loam. The substratum is light yellowish brown loamy sand. Bedrock is at a depth of more than 80 inches. On some streambanks and low convex mounds, the surface layer is loamy sand overwash and thin strata of sand and loam occurs

Figure 17.—An area of Grigsby-Urban land complex, 0 to 6 percent slopes, occassionally flooded. Areas of this map unit generally occur as narrow strips along streams. Roads, houses, and commercial buildings are interspersed with undeveloped areas. Low-lying areas are subject to occasional flooding.

throughout the profile. In other areas, textures are loam or silt loam throughout the profile.

The Grigsby soil has high natural fertility and moderate organic matter content. Permeability is moderately rapid, the available water capacity is high, and surface runoff is low. A seasonal high water table is at a depth of about 42 inches during winter and early spring. This soil is subject to occasional flooding; however, it is generally not flooded during the growing season. This soil is easy to till and can be worked throughout a wide range in moisture content. The root zone is very deep and easily penetrated.

Urban land is areas covered by roads, parking lots, buildings, and other structures, as well as areas of residential development that are relatively dense when compared to farmed areas. Urban land also includes campgrounds, parks, cemeteries, railroads, railroad yards, and school yards. Urban land in this map unit is subject to occasional flooding; however, some areas are protected from flooding by filling over the flood plain. Some areas of Urban land have been altered by ditches and storm drains.

Included in mapping are small areas of Rowdy soils on low stream terraces and Holly soils in seep spots. Small areas of Udorthents are along major roads, and a few areas of soils that are less than 40 inches deep to bedrock are along narrow drainageways. Most individual areas of the minor soils are less than 3 acres in size.

The Grigsby soil is used mainly for lawns, recreational areas, gardens, feed lots, and pasture. Urban land consists of sites for residences, commercial buildings, barns, parks, and cemeteries; right-of-ways for roads and railroads; and water, gas, power, and communication facilities.

The Grigsby soil is suited to row crops, gardening, hay, and pasture. High yields can be obtained if the soil

is properly managed. Most flooding occurs in winter or early spring, and crops are seldom damaged. Pasture plantings should be frequent enough to maintain the desired plants. Applying lime and fertilizer, using proper stocking rates and rotational grazing, and controlling weeds are important practices. The Grigsby soil can be cropped or gardened continuously if management practices that maintain soil fertility and organic matter content are used. On Urban land, onsite investigation is necessary to determine the limitations and suitability for any proposed use.

The Grigsby soil is suited to woodland, although most of it has been cleared. Yellow-poplar, eastern white pine, shortleaf pine, white oak, white ash, and black walnut are the most suitable trees for planting. Plant competition is a management concern.

The Grigsby soil is poorly suited to most urban development because of flooding. However, proper design and careful site selection can overcome this hazard. Areas of Urban land that have been developed by filling the flood plain with unconsolidated rock and soil are generally subject to less flooding.

This Grigsby soil is in capability subclass IIw, and the Urban land is in capability subclass VIIIs.

HaF—Handshoe-Fedscreek-Marrowbone complex, 30 to 80 percent slopes, very stony

These well drained, steep and very steep soils are on hillsides with warm aspects in northern Knott County in the watersheds of Quicksand Creek, Buckhorn Creek, Salt Lick Creek, and Rock Fork. The Handshoe and Fedscreek soils are very deep. The Marrowbone soil is moderately deep. The Handshoe soil is in coves and on footslopes. The Fedscreek soil is on side slopes and benches. The Marrowbone soil is on nose slopes and upper side slopes. The landscape is dissected by a dendritic pattern of small drainageways that start near the ridgetops and eventually join larger streams. Stones and boulders generally cover about 3 percent of the surface. Much of this complex was once cleared for crops and pasture, and eroded spots and piles of stones are common on lower slopes. Most areas are in the shape of wide bands. They range from 5 to about 600 acres in size.

Handshoe and similar soils make up about 35 percent of this map unit, Fedscreek and similar soils about 25 percent, and Marrowbone and similar soils about 15 percent. Included minor soils make up the remaining 25 percent. These soils are so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Handshoe soil is dark grayish brown very channery loam about 7 inches thick. The upper part of the subsoil, to a depth of about 14 inches, is yellowish brown very channery loam. The middle part, to a depth of about 59 inches, is yellowish brown channery and very channery sandy loam. The lower part is yellowish brown very channery sandy loam. Sandstone bedrock is at a depth of more than 80 inches. In some areas, the surface layer is channery sandy loam.

The Handshoe soil has low natural fertility and organic matter content. Permeability is moderately rapid. Surface runoff is medium. The root zone is very deep, but rock fragments often limit penetration. Depth to bedrock is greater than 60 inches.

Typically, the surface layer of the Fedscreek soil is brown sandy loam about 3 inches thick. The subsoil extends to bedrock. The upper part of the subsoil, to a depth of about 12 inches, is dark yellowish brown sandy loam. The middle part, to a depth of about 19 inches, is brownish yellow sandy loam. The lower part of the subsoil is yellowish brown and strong brown sandy loam. Sandstone bedrock is at a depth of 58 inches. In some areas, the surface layer is loam.

The Fedscreek soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The root zone is deep and easily penetrated.

Typically, the surface layer of the Marrowbone soil is very dark grayish brown fine sandy loam about 2 inches thick. The subsoil, to a depth of about 31 inches, is yellowish brown and brownish yellow fine sandy loam and sandy loam. The substratum is brownish yellow sandy loam. Sandstone bedrock is at a depth of about 37 inches. In some areas, the surface layer is loam.

The Marrowbone soil has low natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is low. Surface runoff is medium. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping on shoulder slopes, nose slopes, and head slopes are small areas of Dekalb, Gilpin, and Ramsey soils. Small areas of Helechawa and Shelocta soils are intermingled with the major soils on benches and footslopes. Most individual areas of the minor soils are less than 5 acres in size.

The major soils are mostly in woodland consisting of secondary growth hardwoods.

These soils are unsuited to cultivated crops, hay, and pasture because of surface stoniness and the hazard of erosion.

These soils are suited to woodland. Northern red oak, yellow-poplar, white oak, black oak, black locust,

blackgum, American beech, sweet birch, sugar maple, and red maple are native trees. Understory plants include flowering dogwood, sourwood, redbud, grape, Virginia creeper, ladyslipper, spicebush, ginseng, jewelweed, violets, wood nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, rue anemone, wood anemone, maidenhair fern, wisteria, wood sorrel, wild geranium, and Solomons seal. White oak, northern red oak, shortleaf pine, and eastern white pine are preferred trees for planting.

The major management concerns for growing timber on these soils are the hazard of erosion and an equipment limitation. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. The main limitation for timber harvesting is steep slopes. Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction. Use of cable yarding systems is safer, reduces damage to the soil, and helps maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of steep slopes, the hazard of erosion, and surface stones.

These Handshoe, Fedscreek, and Marrowbone soils are in capability subclass VIIe.

HeF—Helechawa-Varilla-Jefferson complex, 35 to 75 percent slopes, very rocky

These steep and very steep soils are on the southeast-facing side of Pine Mountain in deeply incised ravines and drainageways. The Helechawa soil is deep and very deep and somewhat excessively drained. The Varilla and Jefferson soils are very deep. The Varilla soil is somewhat excessively drained, and the Jefferson soil is well drained. The elevations along the mountain crest range from 2,000 to about 3,000 feet. Near the base of the mountain, the elevations are 1,000 to 1,600 feet. The slope into the ravines is linear or slightly concave, except where broken by cliffs or ledges and smaller ravines. Most streams in the ravines flow all year and are fed by seeps and smaller streams. In places, sandstone layers form cliffs. Stones and boulders cover less than 5 percent of the surface in most places. One 1,186-acre area of this map unit occurs along the boundary with Harlan County.

Helechawa soil makes up about 27 percent of this map unit, Varilla soil about 27 percent, and Jefferson soil about 20 percent. Included minor soils make up about 21 percent, and areas of rock outcrop make up the remaining 5 percent. These soils are so closely intermingled that they could not be separated at the scale chosen for mapping.

Typically, the surface layer of the Helechawa soil is very dark grayish brown and dark yellowish brown fine sandy loam about 6 inches thick. The subsoil is about 43 inches thick and is yellowish brown. It is fine sandy loam in the upper part and gravelly fine sandy loam in the lower part. Sandstone bedrock is at a depth of about 49 inches.

The Helechawa soil is low in natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is low. Surface runoff is medium. The root zone is deep and very deep. Depth to bedrock ranges from 40 to 80 inches. In some areas, the soil has a dark surface layer and is on cool slopes or at the higher elevations.

Typically, the surface layer of the Varilla soil is very dark grayish brown gravelly fine sandy loam about 3 inches thick. The subsoil extends to a depth of about 64 inches. It is yellowish brown gravelly fine sandy loam in the upper part, yellowish brown very cobbly and extremely cobbly sandy loam in the middle part, and yellowish brown extremely cobbly loamy sand in the lower part.

The Varilla soil is low in natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is low. Surface runoff is medium. The root zone is very deep, but rock fragments often restrict penetration. Depth to bedrock is greater than 60 inches. In some areas, the soil has a dark surface layer and is on cool slopes or at the higher elevations.

Typically, the surface layer of the Jefferson soil is brown loam about 6 inches thick. The subsoil extends to a depth of about 60 inches. It is yellowish brown loam in the upper part and yellowish brown gravelly loam in the lower part.

The Jefferson soil is low in natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The root zone is very deep and easily penetrated by roots. Depth to bedrock is greater than 60 inches. In some areas, the soil has a dark surface layer and is on cool slopes or at the higher elevations. In other areas, the subsoil contains more silt and clay.

Included in mapping are small areas of Alticrest, Gilpin, Ramsey, and Wallen soils on narrow knolls and nose slopes. Poorly drained sandy soils are along

some of the narrow drainageways at the heads of coves. Most areas of the minor soils are less than 2 acres in size.

The major soils are mainly in woodland consisting of secondary growth hardwoods with some scattered pine plantations.

These soils are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, surface stones, and rock outcrops.

These soils are suited to woodland. Productivity is moderate. In the average stand that is fully stocked, white oak on the Helechawa soil can reach a height of about 70 feet in 50 years. White oak, chestnut oak, scarlet oak, blackgum, American beech, yellow-poplar, and red maple are common native trees. Where adjacent to drainageways and sheltered by cliffs, eastern hemlock is common. Understory plants include a dense understory of rhododendron and mountain laurel, as well as flowering dogwood, American hornbeam, sassafras, sourwood, and greenbrier. Herbaceous species include grape, Virginia creeper, ladyslipper, spicebush, jewelweed, violets, wood nettle, poison ivy, bedstraw, sweet anise, grape fern, rue anemone, wood anemone, wild geranium, and Solomons seal. Eastern white pine, shortleaf pine, and white oak are preferred trees for planting.

The main concerns in managing timber on these soils are the hazard of erosion, an equipment limitation, seedling mortality, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. The main limitation for timber harvesting is steep slopes. Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction. Using cable yarding systems is safer, reduces damage to the soil, and helps maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

The potential for woodland wildlife habitat is fair or good. The habitat can be maintained or improved by providing food, cover, nesting areas, and den sites. Brushy thickets can be established by clearing small areas in large tracts of mature woodland. Food plots or areas of green browse can be established along logging roads and trails. The habitat in areas of native plants can be improved by disking and applying fertilizer. Den trees should not be harvested. Brush piles or other nesting sites are needed.

These soils are unsuited to urban uses because of steep slopes and rock outcrops.

These Helechawa, Varilla, and Jefferson soils are in capability subclass VIIe.

HsF—Highsplint-Shelocta-Dekalb complex, 35 to 80 percent slopes, very stony

These well drained, steep and very steep soils are on the slopes of Black Mountain with warm aspects in southern Letcher County. The very deep Highsplint soil is on linear side slopes and footslopes above drainageways. The deep Shelocta soil is on benches and concave side slopes. The moderately deep Dekalb soil is on nose slopes and sharp convex side slopes between drainageways. Black Mountain is dissected by a dendritic pattern of small drainageways that start near the ridgetops and eventually join larger streams. Sharp-crested nose slopes characterize areas between the drainageways. Stones and boulders generally cover about 3 percent of the surface. Because much of the lower slopes were once cleared for cultivated crops and pasture, eroded spots and piles of stones are common. Most areas of this map unit are in the shape of wide bands. They range from 50 to about 600 acres in size.

Highsplint and similar soils make up about 35 percent of this map unit, Shelocta and similar soils about 25 percent, and Dekalb and similar soils about 15 percent. Minor included soils make up the remaining 25 percent. These soils form a regular repeating pattern on the landscape but are so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Highsplint soil is dark brown very channery silt loam about 4 inches thick. The upper part of the subsoil, to a depth of about 11 inches, is yellowish brown very channery silt loam. The middle part, to a depth of about 28 inches, is yellowish brown very channery silty clay loam. The lower part of the subsoil, to a depth of about 60 inches, is yellowish brown very channery loam. Depth to bedrock is greater than 72 inches. In some areas, the subsoil has fewer rock fragments. In other areas, it contains more than 90 percent rock fragments.

The Highsplint soil has low natural fertility and organic matter content. Permeability is moderate, the available water capacity is low, and surface runoff is high. The root zone is very deep, but rock fragments often restrict penetration.

Typically, the surface layer of the Shelocta soil is dark grayish brown channery silt loam about 5 inches thick. The subsoil, to a depth of about 46 inches, is yellowish brown and strong brown channery silty clay loam. The substratum is yellowish brown very channery silty clay loam grading to soft siltstone at a depth of about 52 inches. Interbedded soft siltstone and shale

extend to a depth of more than 60 inches. In some areas, the surface layer is loam. In other areas, depth to bedrock is greater than 60 inches.

The Shelocta soil has medium natural fertility and moderate organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is deep and easily penetrated.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 2 inches thick. The subsoil is yellowish brown channery and very channery sandy loam. Fractured sandstone bedrock is at a depth of about 25 inches. In some areas, the surface layer has more stones. In other areas, rock fragments are siltstone or shale.

The Dekalb soil has low natural fertility and organic matter content. Permeability is rapid, and the available water capacity is low. Surface runoff is low. The root zone is moderately deep, but rock fragments often limit penetration. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping on shoulder slopes and nose slopes are small areas of Gilpin soils. Fedscreek soils are on lower side slopes and some benches, and Guyandotte and Kimper soils are on narrow footslopes with cool aspects. In places, surface mines, deep mine entrances, and haul roads are intermingled with the undisturbed forest. Most individual areas of the minor soils and miscellaneous areas commonly are less than 5 acres in size.

The major soils are mainly in woodland consisting of secondary growth hardwoods and scattered pine plantations.

These soils are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, and surface stones.

These soils are suited to woodland. Yellow-poplar, chestnut oak, northern red oak, black locust, American beech, white oak, sugar maple, red maple, and black cherry are native trees. Understory plants include grape, Virginia creeper, ladyslipper, spicebush, ginseng, jewelweed, violets, wood nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, rue anemone, wood anemone, maidenhair fern, wisteria, wood sorrel, wild geranium, and Solomons seal. White oak, shortleaf pine, and eastern white pine are preferred trees for planting.

The main concerns in managing timber on these soils are the hazard of erosion, an equipment limitation, seedling mortality, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. The main limitation for timber harvesting is steep slopes. Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction. Using cable yarding systems is safer, reduces soil damage, and helps maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of steep slopes and surface stones.

These Highsplint, Shelocta, and Dekalb soils are in capability subclass VIIe.

HtF—Highsplint-Shelocta-Muse complex, 30 to 80 percent slopes, extremely stony

These well drained, steep and very steep soils are on the northwest-facing lower slopes of Pine Mountain in southern Letcher County. The very deep Highsplint soil formed in landslide debris from mass wasting of soil and rock and is in shallow coves and on footslopes, side slopes, and benches. The Shelocta and Muse soils are deep and on lower benches and in ravines where debris coverage is thin or nonexistent. Across the mountain, the slope is distinctly corrugated. Small streams in the grooves commonly begin near the mountain crest and run almost to the base before joining larger streams. Stones and boulders generally cover about 0.1 to 15 percent of the surface. They cover as much as 70 percent of the surface in some ravines and on benches. Because much of the lower slopes were once cleared for cultivated crops and pasture, eroded spots and piles of stones are common. One 990-acre area of this map unit occurs in Letcher County near the border with Harlan County. This map unit extends from near the county line along the base of Pine Mountain and terminates near the head of Little Cowan Creek.

Highsplint and similar soils make up about 30 percent of this map unit, Shelocta and similar soils about 25 percent, and Muse and similar soils about 15 percent. Minor included soils make up the remaining 30 percent. These soils are in a regular repeating pattern on the landscape but are so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Highsplint soil is brown channery silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is dark yellowish brown channery silt loam. The middle part, to a depth of about 55 inches, is yellowish brown very channery silt loam. The lower part of the

subsoil is dark yellowish brown and yellowish brown very channery silt loam. Depth to bedrock is greater than 80 inches. In some areas, the surface layer has more stones. In other areas, rock fragments are mostly siltstone.

The Highsplint soil has low natural fertility and organic matter content. Permeability is moderate, the available water capacity is low, and surface runoff is high. The root zone is very deep, but rock fragments often restrict penetration.

Typically, the surface layer of the Shelocta soil is dark grayish brown channery silt loam about 5 inches thick. The subsoil, to a depth of about 46 inches, is yellowish brown and strong brown channery silty clay loam. The substratum is yellowish brown very channery silty clay loam grading to soft siltstone at a depth of about 52 inches. Interbedded soft siltstone and shale extend to a depth of more than 60 inches. In some areas, the surface layer is loam. In other areas, depth to bedrock is greater than 60 inches.

The Shelocta soil has medium natural fertility and moderate organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is deep and easily penetrated.

Typically, the surface layer of the Muse soil is very dark gray silt loam about 5 inches thick. The upper part of the subsoil, to a depth of about 40 inches, is brown silty clay loam and channery silty clay loam. The lower part, to a depth of about 48 inches, is yellowish brown very channery silty clay loam. The subsoil, to a depth of about 53 inches, is yellowish brown extremely channery silty clay loam. Weathered siltstone is at a depth of about 53 inches. In some areas, the surface layer is darker and more than 7 inches thick.

The Muse soil has low natural fertility and moderate organic matter content. Permeability is slow, and the available water capacity is high. Surface runoff is very high. The root zone is deep and easily penetrated. Depth to bedrock ranges from 40 to 60 inches.

Included in mapping are small areas of Berks soils on narrow nose slopes and Cloverlick, Kimper, and Guyandotte soils in narrow coves between the nose slopes. A deep soil that weathered from shale is along narrow drainageways that have incised deeply into the tilted bedrock. Individual areas of the minor soils commonly are less than 5 acres in size.

The major soils are mainly in woodland consisting of secondary growth hardwoods.

These soils are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, and surface stones.

These soils are suited to woodland. Yellow-poplar, American basswood, chestnut oak, northern red oak, black locust, cucumbertree, white oak, sugar maple, red maple, and black cherry are native trees. Understory plants include grape, Virginia creeper, ladyslipper, spicebush, ginseng, jewelweed, violets, wood nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, rue anemone, wood anemone, maidenhair fern, wisteria, wood sorrel, wild geranium, and Solomons seal. Yellow-poplar, white oak, northern red oak, black walnut, and eastern white pine are preferred trees for planting.

The main concerns in managing timber on these soils are the hazard of erosion, an equipment limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. The main limitation for timber harvesting is the steep and very steep slopes. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of the steep slopes and surface stones.

These Highsplint, Shelocta, and Muse soils are in capability subclass VIIe.

Hy—Holly loam, frequently flooded

This very deep, poorly drained, nearly level soil is in wet areas, seep spots, and depressions on flood plains in Letcher County. Slopes are smooth and slightly concave and range from 0 to 2 percent. Most areas are in the shape of narrow bands and small ovals, are parallel to stream flow, and, in places, include whole valley floors. They range from 5 to about 25 acres in size.

Typically, the surface layer is light brownish gray loam about 3 inches thick. The subsoil and substratum are mottled gray loam and sandy loam to a depth of more than 72 inches. Bedrock is at a depth of more than 72 inches. In some areas, the surface layer is silt loam. In other areas, the subsoil extends to bedrock.

The Holly soil is low in natural fertility and organic matter content. Permeability is moderate. Surface runoff is negligible, and the available water capacity is high. This soil is subject to frequent flooding but generally not during the growing season. A seasonal high water table extends to the surface during winter and early spring. Tillage is often delayed until late in spring. The root zone is very deep, but penetration is limited by water. Depth to bedrock is greater than 65 inches.

Included in mapping are narrow strips of Grigsby soils on streambanks. Small areas of Udorthents are

common where flood plains have been filled for building sites. In places, about 10 percent of mapped areas are made up of somewhat poorly drained soils on slightly higher terrace landforms. The included soils make up about 15 percent of the map unit, but individual areas of these soils commonly are less than 2 acres in size.

The Holly soil is mostly in areas that are idle or reforesting. In a few places, it remains cleared for hay and pasture.

This soil is unsuited to cultivated crops because of wetness. Moderate yields can be obtained only in years with below average rainfall or by using artificial drainage.

This soil is suited to pasture and hay. High yields can be obtained in years of low rainfall or in areas that have been artificially drained. Flooding in late winter and early spring may damage some hay crops. Plants that are adapted to wetness, such as tall fescue, reed canarygrass, big bluestem, alsike clover, and ladino clover, should be selected. Reed canarygrass grows exceptionally well in the wettest areas because it is tolerant of standing water. Both tall fescue and reed canarygrass form a sod firm enough for cattle to graze on without excess miring. Deep-rooted plants such as alfalfa are not recommended for this soil. Measures that prevent overgrazing and maintain stands are needed. Overgrazing weakens stands and allows weeds to grow. Rushes and sedges are common in overgrazed areas and in unimproved areas. Management practices that maintain fertility, tilth, and organic matter are needed. Applying lime and fertilizer, using proper stocking rates, rotating grazing, and controlling weeds are important practices for producing adequate yields of forage on this soil.

This soil is suited to woodland, although much of it has been cleared. Eastern white pine, green ash, pin oak, cherrybark oak, and sweetgum are suitable trees for planting. Plant competition is a management concern because the seasonal high water table creates conditions favorable for the growth of invading brushy plants.

This soil is unsuited to urban uses because of wetness and flooding.

This soil is in capability subclass IIIw.

ImF—Itmann very channery sandy loam, 4 to 80 percent slopes

This very deep, somewhat excessively drained, sloping to very steep soil formed dominantly in coal and high-carbon shale resulting from coal mining. The soil is dominantly on valley fills and on the steep slopes close to active or abandoned coal mines. Most areas of this soil are active storage or waste dumping sites that are unreclaimed. In a few areas, waste is ponded. Slope ranges from 4 to 80 percent but is dominantly 12 to 60 percent. The steepest slopes are cone-shaped storage areas formed by the dumping and spreading of coal around active coal tipples (fig. 18). Small areas of this map unit are scattered throughout the survey area, but most of the acreage is in Letcher County. Most areas have an irregular shape and range from 3 to about 40 acres in size.

Typically, the surface is very dark gray very channery sandy loam about 5 inches thick. The substratum is very dark gray very channery and extremely channery loam, sandy loam, and fine sandy loam. About 60 percent of the rock fragments are high carbon siltstone, 15 percent shale, 15 percent sandstone, and 10 percent carboliths, or coal. Depth to bedrock is more than 65 inches.

The Itmann soil has very low natural fertility and low organic matter content. Permeability is moderately rapid or rapid. The available water capacity is low. Surface runoff is low or medium in the less sloping areas and rapid on steeper slopes. The root zone is very deep, but the soil is strongly acid to extremely acid throughout the profile. Depth to bedrock ranges from 60 to more than 100 inches.

Included with this soil in mapping are small areas of Grigsby soils on low-lying stream terraces and flood plains. Also, some areas of this soil have been fired by underground combustion, leaving behind a hardened shale known locally as "red dog." The included minor soils make up about 10 percent of the map unit.

Most areas of the Itmann soil are barren. A few areas are vegetated with warm-season grasses or small trees.

This soil is unsuited to cultivated crops, hay, and pasture because of the slope, very low natural fertility, and the hazard of erosion. Establishing and maintaining existing plant cover in unprotected areas and providing proper surface water disposal are essential in controlling erosion and sedimentation. Most steep and very steep areas are difficult to revegetate because of low fertility, low available water capacity, acidity, and high summer temperatures. Diversions and silt fencing should be used around any newly seeded, limed, fertilized, or mulched area.

Potential productivity for woodland is very low, and this soil is unsuited to habitat for woodland wildlife.

Onsite investigation and testing is needed to determine the limitations and potential hazards of this soil for most uses. The included areas of burned soil material, or "red dog," are often used as a local source of road subgrade and fill material.

This soil is in capability subclass VIIs.

Figure 18.—Itmann very channery sandy loam, 4 to 80 percent slopes, is commonly made up of coal stockpiles, refuse areas, and coal tipples. Note the "gob pile" above the conveyor belt remaining from a previous coal operation in the early 1900's.

KfF—Kaymine, Fairpoint, and Fiveblock soils, benched, 2 to 70 percent slopes, very stony

These very deep, nearly level to very steep soils are on ridgetops and hillsides throughout the survey area. They formed in a mixture of soil material and material that weathered from underlying bedrock in areas that have been surface mined for coal. The Kaymine and Fairpoint soils are well drained. The Fiveblock soil is somewhat excessively drained. Slopes are complex. Stones and flagstones are widely scattered throughout the map unit. Most areas are in the shape of narrow, winding bands that follow ridgetops or the contours of hillsides. They range from 5 to about 500 acres in size.

In a typical area, about 40 percent of the map unit is Kaymine soil, 20 percent is Fairpoint soil, and 15 percent is Fiveblock soil. The remaining 25 percent is made up of included minor soils, roads, coal-processing areas, and water. The pattern and proportion of these soils are generally not uniform. Individual areas may contain one or all three soils. This variability is due to differences in parent material and reclamation practices. Individual areas of each soil are generally large enough to be mapped separately, but because of the present and anticipated uses, these soils were mapped as an undifferentiated unit.

Typically, the surface layer of the Kaymine soil is grayish brown channery silt loam about 4 inches thick. The underlying substratum is brown and dark gray very channery and very flaggy silt loam to a depth of more than 65 inches. The content of sandstone, siltstone, and shale channers ranges from 20 to 50 percent. Depth to bedrock is greater than 80 inches.

Typically, the surface layer of the Fairpoint soil is dark gray channery silty clay loam about 4 inches thick. The underlying substratum is gray and very dark grayish brown channery and very channery silty clay loam to a depth of more than 65 inches. The content of sandstone, siltstone, and shale channers ranges from 25 to 75 percent. Depth to bedrock is greater than 80 inches.

Typically, the surface layer of the Fiveblock soil is brown channery sandy loam about 2 inches thick. The

underlying substratum is pale brown, grayish brown, and dark gray channery and very channery sandy loam to a depth of more than 65 inches. The content of flagstones and channers, dominantly sandstone, is greater than 65 percent. Bedrock is at a depth of more than 65 inches.

These soils have low natural fertility and very low organic matter content. Permeability is moderate or moderately rapid in the Kaymine soil, moderately slow in the Fairpoint soil, and rapid in the Fiveblock soil. These soils have low available water capacity. Surface runoff is low or medium on benches but high on the steep slopes of hollow and contour fills. The root zone is very deep, but rock fragments and compaction often hinder penetration.

Included in mapping are small areas of Itmann soils in coal-processing areas and Shelocta soils on side slopes that protrude slightly into mapped areas. Mine soils that are acid in the subsoil make up as much as 20 percent of some areas. An escarpment of bedrock 30 to 75 feet high and locally known as a highwall is common on the benched portion of this map unit. Small bodies of water, seep areas, diversions, and haul roads are commonly adjacent to the highwall on the benched portion of this unit. A few areas lack vegetative cover because they have been severely eroded or only recently mined.

Most areas of the major soils are idle or producing grasses, legumes, or trees. A few areas are used for pasture, but little management has been applied, except for fencing (fig. 19). Most areas have been limed and fertilized at least once during reclamation.

These soils are unsuited to cultivated crops. Rock fragments interfere with tillage operations, and the lack of moisture during dry years makes good yields unlikely. These soils are suited to pasture and hay. Most grasses and legumes grown in the survey area will grow on these soils. Surface stones restrict the use of tillage implements, and settling is irregular in places. Vegetative treatment that provides a quick and permanent cover helps to control erosion. When seeding areas of this map unit, the spoil must be graded smooth enough for planting and harvesting equipment.

These soils are suited to woodland. Eastern white pine, black locust, and autumn olive are commonly used in reclamation. Good-quality planting stock is required for maximum survival rates and growth. Erosion, an equipment limitation, and seedling mortality are management concerns on these soils.

Areas that are graded, seeded, and planted to herbaceous or woody plants have good potential for wildlife food or cover. Any planting that provides adequate vegetative cover and controls erosion is beneficial to wildlife. Strip plantings of herbaceous plants and trees are more attractive than solid plantings. Good plant cover requires maintenance, including applications of fertilizer and reseeding or replanting in spots where vegetation has failed to establish.

These soils have moderate or severe limitations for most urban uses. The soils on gentle slopes are suited to building sites. Foundations need extra reinforcement in these soils because the soils are subject to differential settling, especially for the first few years after mining.

These Kaymine, Fairpoint, and Fiveblock soils are in capability subclass VIIs.

KrF—Kimper-Cloverlick-Renox complex, 30 to 80 percent slopes, extremely stony

These very deep, well drained, steep and very steep soils are on the northwest-facing upper slopes of Pine Mountain in southern Letcher County. The Kimper soil is on linear side slopes and in coves. The Cloverlick soil is on narrow benches and linear or slightly concave side slopes covered with landslide debris. The Renox soil is on linear side slopes and benches over calcareous shale and limestone, generally below the Kimper and Cloverlick soils. Pine Mountain is dissected by a dendritic pattern of small drainageways that start near the ridgetop and eventually join larger streams at the foot of the mountain. The downward slope of the mountain is nearly linear, except where broken by small cliffs or benches. Across the mountain, the slope is distinctly corrugated. Stones and boulders generally cover about 10 percent of the surface; however, some benches are completely blanketed with stones. A narrow band of these soils totaling 3,478 acres runs the length of Pine Mountain from the border with Harlan County to the border with Pike County.

Kimper and similar soils make up about 30 percent of the map unit, Cloverlick and similar soils about 25 percent, and Renox and similar soils about 20 percent. The remaining 25 percent is made up of minor included soils. These soils occur in a repeating pattern on the landscape but are so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Kimper soil is dark brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of about 10 inches, is brown silt loam. The middle part of the subsoil, to a depth of about 62 inches, is yellowish brown silt loam. The lower part is brown very channery loam. Bedrock is at a depth of more than 80 inches. In some areas, the

Figure 19.—Areas of Kaymine, Fairpoint, and Fiveblock soils, benched, 2 to 70 percent slopes, very stony, form a pattern of reclaimed landforms on surface mines. Note the "riprap chutes" and diversions used for controlling runoff. These soils have potential for use as pasture because they formed in rock strata that is neutral or only slightly acid.

surface layer is more than 10 inches thick. In other areas, it has more stones.

The Kimper soil has medium natural fertility and high organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is very deep and easily penetrated.

Typically, the surface layer of the Cloverlick soil is very dark grayish brown channery loam about 9 inches thick. The upper part of the subsoil, to a depth of about 35 inches, is yellowish brown very channery loam. The middle part, to a depth of about 44 inches, is yellowish brown very flaggy loam. The lower part is yellowish brown very channery loam. Depth to bedrock ranges from 60 to 100 inches or more. In some places, the surface layer has more stones. In other places, the subsoil is silt loam.

The Cloverlick soil has low natural fertility despite having high organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is medium. The root zone is very deep, but rock fragments restrict penetration.

Typically, the surface layer of the Renox soil is dark yellowish brown silt loam about 5 inches thick. The upper part of the subsoil, to a depth of about 13 inches, is dark yellowish brown channery silt loam. The middle part, to a depth of about 30 inches, is strong brown channery silt loam and channery loam. The lower part of the subsoil, to a depth of about 60 inches, is yellowish brown silty clay loam and channery silty clay loam. The substratum is yellowish brown channery silty clay loam. In some areas, the surface layer is thicker.

The Renox soil has high natural fertility and organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is very deep and easily penetrated. Depth to bedrock ranges from 40 to more than 80 inches.

Included in mapping are small areas of Highsplint soils on upper side slopes and Summers soils on nose slopes. A moderately deep soil weathered from shale is on shoulder slopes, and a shallow soil that has a dark surface layer more than 10 inches thick is on head slopes of coves. Individual areas of the minor soils commonly are less than 5 acres in size.

The major soils are mainly in woodland consisting of secondary growth hardwoods.

These soils are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, and surface stones.

These soils are suited to woodland. Yellow-poplar, American basswood, sweet birch, northern red oak, black locust, cucumbertree, white oak, sugar maple, and red maple are native trees. Understory herbaceous plants include Virginia creeper, spicebush, ginseng, jewelweed, violets, stinging nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, waterleaf, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, wood anemone, maidenhair fern, silvery gladefern, wood sorrel, wild geranium, and Solomons seal. White oak, northern red oak, white ash, black walnut, and eastern white pine are preferred trees for planting.

The main concerns for managing timber on these soils are the hazard of erosion, an equipment limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless protected by adequate water bars or plant cover, or both. The main limitation for timber harvesting is steep slopes. Cable yarding systems are safer, reduce damage to the soil, and help maintain productivity. Reforestation after harvesting must be managed with care to reduce plant competition.

These soils are unsuited to urban uses because of steep slopes and surface stones.

These Kimper, Cloverlick, and Renox soils are in capability subclass VIIe.

Pt—Pits, quarries

This map unit consists of areas where limestone bedrock has been quarried and a few areas where stockpiles of gravel are stored for processing into asphalt (fig. 20). The soil and commonly several feet of bedrock have been removed, and a pit that has bedrock at the bottom remains. Pits generally have vertical walls around most of the mined areas.

Included in mapping are mounds of soil, broken pieces of bedrock, and a few mounds of limestone that have been graded into sizes for riprap or road gravel or for crushing into agricultural lime. The mounds of soil and pieces of bedrock are variable in size. Some areas are dominantly soil, others are dominantly rock. The pieces of bedrock are sandstone, shale, and limestone and range from 1 inch to about 3 feet in diameter. In most places, this map unit has little or no vegetative cover.

Pits, quarries, is in capability subclass VIIIs.

RgB—Rowdy-Grigsby complex, 0 to 4 percent slopes, occasionally flooded

These very deep, well drained, nearly level and gently sloping soils are along rivers and major streams throughout the survey area. Slopes are smooth but are commonly dissected by small drainageways. The Rowdy soil is on slightly convex low stream terraces and alluvial fans. The Grigsby soil is on flood plains closer to streams and rivers. Most areas are in the shape of long narrow bands, are parallel to streamflow, and commonly make up whole valley floors. They range from 10 to about 200 acres in size.

Rowdy soil makes up about 45 percent of this map unit and Grigsby soil about 35 percent. The remaining 20 percent is made up of minor included soils. These soils are in a regular repeating pattern on the landscape, but it was not practical to separate them at the scale chosen for mapping.

Typically, the surface layer of the Rowdy soil is brown loam about 10 inches thick. The upper part of the subsoil, to a depth of about 47 inches, is yellowish brown silt loam and loam. The lower part, to a depth of about 65 inches, is brownish yellow loam. The substratum, to a depth of 80 inches or more, is pale brown clay loam. In some areas, the surface layer is silt loam. In other areas, it has more rock fragments.

The Rowdy soil has medium natural fertility and moderate organic matter content. Permeability is moderate, the available water capacity is high, and surface runoff is low. In most places, this soil is subject to occasional flooding. However, it is generally not flooded during the growing season or for long duration. This soil is easy to till and can be worked throughout a wide range in moisture content. The root zone is very deep and easily penetrated. Bedrock is at a depth of more than 60 inches.

Typically, the surface layer of the Grigsby soil is brown sandy loam about 9 inches thick. The upper part of the subsoil, to a depth of about 44 inches, is brown and dark yellowish brown sandy loam. The lower part of the subsoil, to a depth of 52 inches, is light yellowish brown sandy loam. The substratum is light yellowish brown loamy sand. Bedrock is at a depth of more than 80 inches. In some areas, the surface layer is loamy sand overwash. In other areas, it has more rock fragments.

The Grigsby soil has high natural fertility and moderate organic matter content. Permeability is moderately rapid, the available water capacity is high, and surface runoff is low. A seasonal high water table is at a depth of about 42 inches during winter and early spring. This soil is subject to occasional flooding. However, it is generally not flooded during the growing

Figure 20.—Areas of Pits, quarries, are mostly limestone quarries on Pine Mountain. Note the upturned rock strata in the background and the stockpiles of gravel being prepared for trucking. The slope above the quarry is an area of Kimper-Cloverlick-Renox complex, 30 to 80 percent slopes, extremely stony.

season or for long duration. This soil is easy to till and can be worked throughout a wide range in moisture content. The root zone is very deep and easily penetrated.

Included in mapping on footslopes are narrow strips of Allegheny soils that protrude slightly into mapped areas and Holly soils in seep spots. A sandy soil that has redoximorphic features at a depth of about 15 inches is on low spots on flood plains and makes up as much as 10 percent of some areas. In the Cumberland River Valley, a soil that is similar to the Rowdy soil but has more rock fragments in the subsoil is at the head of drainageways. A soil deposited by flooding that has thin strata of sand and loam throughout the profile is on streambanks. These included soils make up about 20 percent of the map unit, but individual areas of these soils commonly are less than 2 acres in size.

The major soils are used for hay and cultivated crops and for pasture. On footslopes and alluvial fans, areas of the major soils and some included soils are used for homesites because they generally are not subject to flooding. A few areas are wooded.

These soils are suited to cultivated crops, and high yields can be obtained if the soils are properly managed. Erosion is a limitation in sloping areas, and flooding may delay planting. Crops respond favorably to fertilizer and lime. Returning crop residue to the soil and using grasses and legumes in the cropping sequence help to maintain tilth and organic matter content.

These soils are suited to hay and pasture (fig. 21). High yields can be obtained if the soils are properly managed. Pasture renovation should be frequent enough to maintain the desired plants. Applying lime and fertilizer, using proper stocking rates, rotating grazing, and controlling weeds are important practices.

These soils are suited to woodland, although most

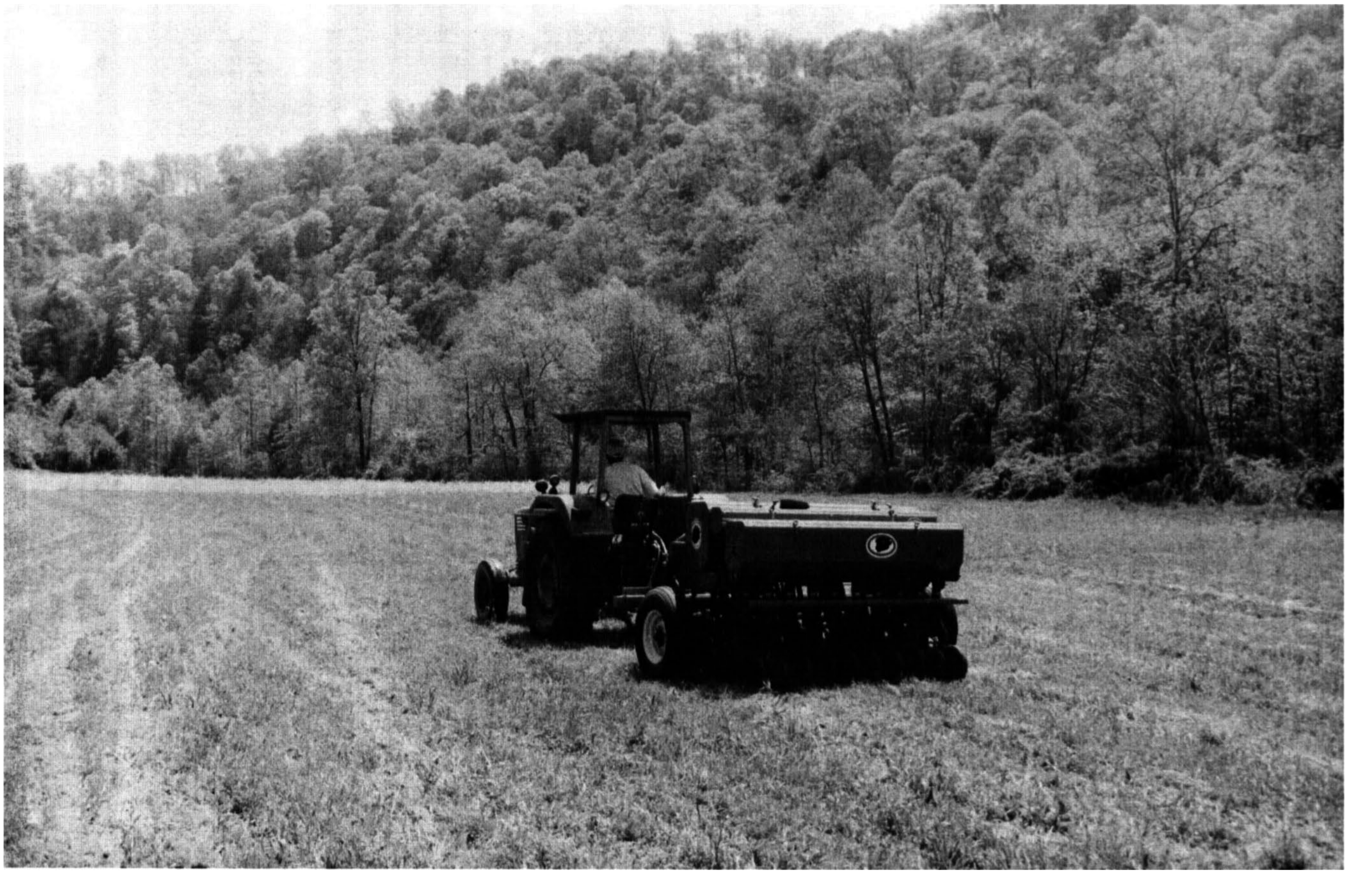

Figure 21.—Areas of Rowdy-Grigsby complex, 0 to 4 percent slopes, occasionally flooded, make excellent sites for improved pasture and may be intensively grazed. These areas are easily tilled and dry out quickly in early spring. The hillside in the background is an area of Shelocta-Highsplint complex, 30 to 65 percent slopes, very stony.

areas have been cleared. Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, and white ash are suitable trees for planting. Plant competition is a management concern because site conditions favor the establishment of invading brushy plants.

Most areas of the major soils are unsuited to urban uses because of flooding. However, selecting landform positions above the flood plain may reduce or overcome this hazard.

These Rowdy and Grigsby soils are in capability subclass IIw.

ShF—Shelocta-Highsplint complex, 30 to 65 percent slopes, very stony

These well drained, steep and very steep soils are on hillsides with warm aspects in central and southern Knott County and most of Letcher County, except on the higher slopes of Pine Mountain and Black Mountain. The deep Shelocta soil is in coves, on lower side slopes, and on benches. The very deep Highsplint soil is on upper side slopes, head slopes, benches, and footslopes. Stones, flagstones, and boulders are scattered throughout this complex and cover 1 to 3 percent of the surface area, but they are more common on benches, along drainageways, and in the few areas that remain cleared for pasture. Most areas are in the shape of wide bands, separated from narrow ridgetops and the widest valley floors. They range from 50 to about 1,200 acres in size.

Shelocta and similar soils make up about 55 percent of mapped areas and Highsplint and similar soils about 25 percent. The remaining 20 percent is made up of minor included soils. These soils form a repeating pattern on the landscape but could not be separated at the scale selected for mapping.

Typically, the surface layer of the Shelocta soil is brown silt loam about 3 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is yellowish brown silt loam. The middle part, to a depth of about 27 inches, is strong brown silt loam. The lower part of the subsoil is yellowish brown very channery silt loam. The substratum is yellowish brown very channery silt loam

grading to soft siltstone at a depth of about 56 inches. Soft siltstone extends to a depth of more than 60 inches. In some areas, the subsoil is loam throughout. In other areas, depth to bedrock is more than 80 inches.

The Shelocta soil has medium natural fertility and moderate organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is deep and easily penetrated.

Typically, the surface layer of the Highsplint soil is brown channery silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is dark yellowish brown channery silt loam. The middle part, to a depth of about 55 inches, is yellowish brown very channery silt loam. The lower part of the subsoil is dark yellowish brown and yellowish brown very channery silt loam. Depth to bedrock is greater than 80 inches. In some areas, the surface layer has more rock fragments. In other areas, depth to bedrock is 40 to 60 inches.

The Highsplint soil has low natural fertility and organic matter content. Permeability is moderate, the available water capacity is low, and surface runoff is high. The root zone is very deep, but rock fragments often restrict penetration.

Included in mapping are small areas of Gilpin soils on upper side slopes and nose slopes. Small areas of Fedscreek, Jefferson, and Handshoe soils are on benches, footslopes, and head slopes. In places, Grigsby soils are along narrow drainageways. Individual areas of the minor soils commonly are less than 5 acres in size.

The major soils are generally unsuited to the production of cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, and surface stones.

These soils are suited to woodland and are mostly made up of secondary growth hardwood forest. However, these soils were once largely cleared and farmed from the valley floors to the ridgetops as late as the 1950's. Chestnut oak, white oak, black oak, scarlet oak, northern red oak, red maple, and eastern white pine are native trees on upper slopes. Isolated stands of American beech, northern red oak, mockernut hickory, sugar maple, and yellow-poplar are on lower, moister sites. Understory plants include tick-trefoil, pussytoes, sedum, lousewart, flowering dogwood, redbud, mapleleaf viburnum, gall-of-the-earth, New Jersey tea, panicum, early saxifrage, azalea, greenbrier, blackgum, wild grape, Solomons seal, stinging nettle, false nettle, and horsebalm. Eastern white pine, shortleaf pine, black oak, white oak, northern red oak, and white ash are suitable trees for planting.

The hazard of erosion, equipment limitation, seedling mortality, and plant competition are concerns in managing woodland on these soils. Steep skid trails and roads are subject to rilling and gullying unless adequate water bars, plant cover, and culverts protect them. Steep slopes restrict the use of wheeled and tracked equipment on skid trails. Cable yarding is safer and disturbs the soil less. Selecting areas of the Shelocta soil for reforestation helps to reduce seedling mortality rates. Reforestation after harvesting must be managed carefully to reduce undesirable plant competition.

These soils are generally unsuited to urban uses because of steep slopes and surface stones.

These Shelocta and Highsplint soils are in capability subclass VIIe.

SmF—Shelocta-Muse complex, 15 to 50 percent slopes, very stony

These deep, well drained, moderately steep to very steep soils are on cool aspects of concave lower side slopes and benches at the base of Pine Mountain in southern Letcher County near the town of Jenkins. Pine Mountain is dissected by a dendritic pattern of small drainageways that start near the ridgetops and eventually join larger streams. In most places, the small drainageways are about 300 to 600 feet apart and give the mountainside a corrugated appearance. Stones and boulders generally cover about 2 percent of the soil surface, but in some areas they cover nearly all the surface. Eroded spots and piles of stones are common, as most areas of these soils were once cleared for hay and pasture. One area of this map unit consisting of about 201 acres occurs along the boundary with Pike County.

Shelocta and similar soils make up about 45 percent of mapped areas and Muse and similar soils about 35 percent. The remaining 20 percent is made up of minor soils. These soils form a repeating pattern on the landscape but were so intermingled that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Shelocta soil is dark grayish brown channery silt loam about 5 inches thick. The subsoil, to a depth of about 46 inches, is yellowish brown and strong brown channery silty clay loam. The substratum is yellowish brown very channery silty clay loam grading to soft siltstone at a depth of about 52 inches. Interbedded soft siltstone and shale extends to a depth of more than 60 inches. In some

areas, the surface layer is loam. In other areas, depth to bedrock is greater than 60 inches.

The Shelocta soil has medium natural fertility and moderate organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is high. The root zone is deep and easily penetrated.

Typically, the surface layer of the Muse soil is brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of about 11 inches, is brown silty clay loam. The lower part is yellowish brown channery silty clay. The substratum is mottled light brownish gray very channery silty clay. Weathered shale is at a depth of 53 inches. In some areas, the surface layer is very dark and more than 5 inches thick. In other areas, the subsoil has fewer rock fragments.

The Muse soil has low natural fertility and moderate organic matter content. Permeability is slow. The available water capacity is moderate, and surface runoff is very high. The root zone is deep and easily penetrated. Depth to bedrock ranges from 40 to 60 inches.

Included in mapping are small areas of Gilpin, Fedscreek, Kimper, and Guyandotte soils on linear side slopes and benches. Also included are a few areas of a soil that is redder than the Muse soil and is moderately acid to neutral. In many places, large concentrations of stones and boulders have accumulated along drainageways. Individual areas of these included soils and extremely stony areas commonly are less than 5 acres in size.

The major soils are mainly in woodland consisting of secondary growth hardwoods and a few scattered pine plantations.

These soils are unsuited to cultivated crops, hay, and pasture because of steep slopes, the hazard of erosion, and surface stones.

These soils are suited to woodland. American beech, yellow-poplar, northern red oak, white oak, shortleaf pine, Virginia pine, sugar maple, and red maple are native trees. Understory plants include Virginia creeper, spicebush, ginseng, jewelweed, violets, wood nettle, black snakeroot, jack in the pulpit, yellow mandarin, Christmas fern, poison ivy, waterleaf, bedstraw, bloodroot, sweet anise, pawpaw, grape fern, wood anemone, ladyslipper, maidenhair fern, trillium, silvery gladefern, wood sorrel, wild geranium, and Solomons seal. Northern red oak, poplar, white oak, shortleaf pine, and eastern white pine are preferred trees for planting.

The main concerns in managing timber on these soils are the hazard of erosion, an equipment limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless adequate water bars or plant cover, or both, protect them. The main limitation for timber harvesting is steep slopes. Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction. Puddling can also occur. Use of cable yarding systems is safer, reduces damage to the soil, and helps maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are unsuited to urban uses because of the steep slopes and surface stones.

These Shelocta and Muse soils are in capability subclass VIIe.

UdE—Udorthents-Urban land complex, steep

This complex consists of very deep, well drained, nearly level to steep soil materials called Udorthents and areas of Urban land. It occurs along major highways and railways throughout the survey area and on sites where construction, mining, utility development, or reclamation has required the excavation, dumping, and spreading of fill material. Small areas of this map unit are scattered throughout the survey area, but most of the acreage is along Highway 80 in Knott County and Highway 15 in Letcher County. Slopes range from 0 to 30 percent, but steeper areas are included. Slopes are smooth where shaped by heavy equipment but may be irregular in benched or eroded areas. Most areas are nearly rectangular. They range from 3 to about 50 acres in size.

This map unit is about 60 percent Udorthents and 25 percent Urban land. The remaining 15 percent is included minor soils, miscellaneous areas, and rock escarpments. The soils and Urban land of this map unit are so closely intermingled that they could not be separated at the scale chosen for mapping.

Udorthents consist of areas where the original soil material has been altered or mixed with underlying rock material. Consequently, identification of soil features is not practical. The major soil features are highly variable, and no area is typical. In most areas, the bedrock is very deep and rock fragments vary in size, shape, and amount. In many places, the soil material was transported several hundred yards from the original site to the fill area.

Natural fertility and organic matter of Udorthents are low. Permeability varies widely because the soil material contains varying amounts of sand, silt, clay, and rock fragments. The available water capacity is

moderate or low for the same reason. The root zone is very deep in most areas of Udorthents, but penetration by roots is limited by the amount of rock fragments and by compaction. A few areas along major drainageways are subject to rare flooding.

Urban land is areas covered by streets, parking lots, buildings, and other structures. The underlying soil has been covered or altered so that identification of the soil is not feasible. Most of the Urban land in this map unit is roadways and gravel-covered shoulders. However, this part of the map unit also includes some campgrounds, picnic areas, commercial building sites, utility substations, industrial sites, and parking lots. Urban land in this map unit generally is not subject to flooding. However, a few areas are subject to backwater along major drainageways.

Included in mapping are small areas of Grigsby, Holly, and Rowdy soils on low-lying stream terraces and flood plains adjacent to filled areas. Small ponded or seep areas and rock escarpments are along major roads. These included soils, rock escarpments, and miscellaneous areas make up about 15 percent of the map unit.

Most areas of this map unit are used for commercial or residential development or are under development. Because Udorthents have only a small percentage of natural soil material, they are unsuited to cropland, pasture, hay, and woodland. The included soils are used for parks, lawns, gardens, or building sites. They are suited to vegetable and flower gardens, trees, and shrubs.

Because of the contrasting and variable nature of these soils and Urban land, onsite investigation is needed to determine the suitability and limitations for any proposed use. Maintaining existing plant cover, establishing plant cover in unprotected areas, and properly disposing surface water help to control erosion and sedimentation.

Udorthents are in capability subclass VIs, and Urban land is in capability subclass VIIIs.

UrC—Urban land-Udorthents complex, 0 to 15 percent slopes

This complex consists of very deep, well drained, nearly level to strongly sloping areas of Urban land and soil materials called Udorthents. They are in urban built-up areas, mostly in and around the towns of Hindman and Sassafras in Knott County and in the towns of Blackey, Cromona, Isom, Jenkins, Fleming, McRoberts, Neon, Mayking, Seco, Whitaker, and Whitesburg in Letcher County. Some of these areas are reconstructed valleys formed by the dumping and spreading of fill material onto flood plains or benches cut into hillsides. Older areas follow the natural contour of the land. Slopes are smooth where shaped by heavy equipment but may be irregular on upper slopes or along benched footslopes. In many areas, the natural drainage pattern has been altered by a system of ditches, culverts, or storm drains. Most areas are nearly rectangular. They range from 10 to about 200 acres in size.

This map unit is about 60 percent Urban land and 25 percent Udorthents. The remaining 15 percent is included minor soils. The Urban land and Udorthents are so closely intermingled that they could not be separated at the scale chosen for mapping.

Urban land consists of areas covered by streets, parking lots, buildings, residences, and other structures. Identification of the underlying soil is not feasible. Most of the Urban land in this map unit consists of towns and small cities, but it also includes airports, campgrounds, commercial building sites, golf courses, industrial sites, parking lots, shopping centers, and sewage treatment plants. Some areas along major streams are subject to rare flooding during late winter and early spring.

Udorthents consist of areas where the original soil material has been altered or mixed with underlying rock material. The major soil features are highly variable, and no area is typical. In most areas, the bedrock is very deep and rock fragments vary in size, shape, and amount. In many places, the soil material was transported several hundred yards from the original site to the fill area. In other places, only the surface layer has been disturbed.

Natural fertility and organic matter content of Udorthents are low. Permeability varies widely because the soil material contains varying amounts of sand, silt, clay, and rock fragments. The available water capacity is moderate or low for the same reason. The root zone is very deep in most areas of Udorthents, but penetration is often limited by rock fragments and compaction.

Included in mapping are small areas of Grigsby and Rowdy soils on low-lying stream terraces and flood plains. Holly soils in ponded or seep areas and roads or newly constructed sites that are bare of vegetation are also included in mapping.

Most areas of this map unit are used for commercial or residential development or are under development. Because Udorthents have only a small percentage of natural soil material, they are unsuited to cropland, pasture, hay, and woodland. The included soils are used for parks, lawns, gardens, or building sites. They

are suited to vegetable and flower gardens, trees, and shrubs.

Because of the contrasting and variable nature of the Urban land and soils of this complex, onsite investigation is needed to determine the suitability and limitations for any proposed use. Maintaining existing plant cover, establishing plant cover in unprotected areas, and properly disposing surface water help to control erosion and sedimentation.

Urban land is in capability subclass VIIIs, and Udorthents are in capability subclass VIs.

UuB—Urban land-Udorthents-Grigsby complex, 0 to 6 percent slopes, rarely flooded

This complex consists of very deep, well drained, nearly level to sloping areas of Urban land, Udorthents, and Grigsby soil. It occurs on valley floors throughout the survey area and is subject to rare flooding in late winter and early spring. The Urban land consists mainly of residential and commercial development along highways. Most Udorthents in this map unit are soils created by the transporting of fill material onto flood plains. Urban land and Udorthents have slopes ranging from 0 to 6 percent. The Grigsby soil is on the remaining undisturbed flood plains with slopes of 0 to 4 percent. Slopes are smooth on flood plains or where shaped by heavy equipment but may be irregular along streambanks. In places, the natural drainage pattern has been altered by a system of ditches, culverts, or storm drains. Most areas are in the shape of long, narrow bands that radiate outward from towns. They range from 5 to about 100 acres in size.

This map unit is about 40 percent Urban land, 30 percent Udorthents, and 15 percent Grigsby soil. The remaining 15 percent is undisturbed minor soils. The Urban land and soils of this map unit are so closely intermingled that they could not be separated at the scale chosen for mapping.

Urban land consists of areas covered by streets, parking lots, buildings, residences, and other structures. Identification of the underlying soil is not feasible. Most of the Urban land in this map unit consists of towns and small cities, but it also includes airports, campgrounds, commercial building sites, golf courses, industrial sites, parking lots, shopping centers, and sewage treatment plants.

Udorthents consist of areas where the original soil material has been altered or mixed with underlying rock material. The major soil features are highly variable, and no area is typical. In most areas, the bedrock is very deep and rock fragments vary in size, shape, and amount. In many places, the soil material was transported several hundred yards from the original site to the fill area. In other places, only the surface layer has been disturbed.

Natural fertility and organic matter content of Udorthents are low. Permeability varies widely because the soil material contains varying amounts of sand, silt, clay, and rock fragments. The available water capacity is moderate or low for the same reason. The root zone is very deep in most areas of Udorthents, but penetration by roots is often limited by rock fragments and compaction.

Typically, the surface layer of the Grigsby soil is brown sandy loam about 9 inches thick. It is dark yellowish brown and dark brown sandy loam to a depth of 44 inches. The lower part of the subsoil, to a depth of 52 inches, is light yellowish brown sandy loam. The substratum is light yellowish brown loamy sand. Bedrock is at a depth of more than 80 inches. In some areas, the surface layer is loamy sand. In other areas, the depth to bedrock is 40 to 60 inches.

The Grigsby soil has high natural fertility and moderate organic matter content. Permeability is moderately rapid, the available water capacity is high, and surface runoff is slow. A seasonal high water table is at a depth of about 42 inches during winter and early spring. Low-lying areas of the Grigsby soil may flood more often than Udorthents or Urban land. This soil is easy to till and can be worked throughout a wide range in moisture content. The root zone is very deep and easily penetrated.

Included in mapping are small areas of Rowdy soils on low-lying stream terraces, flood plains adjacent to filled areas, and small ponded or seep areas. These included soils and miscellaneous areas make up about 15 percent of the map unit.

In most areas, this map unit has a high density of residential housing and a few commercial buildings. The residential areas are denser than most farmed areas, but tracts are large enough to include areas for livestock barns, paddocks, gardens, hayfields, and pasture. Most of the gardens and pastures are in areas of the Grigsby soil near streams.

Because of the contrasting and variable nature of the soils and Urban land in this complex, onsite investigation is needed to determine the suitability and limitations for any proposed use. Maintaining existing plant cover, establishing plant cover in unprotected areas, and properly disposing surface water help to control erosion and sedimentation.

Urban land is in capability subclass VIIIs, Udorthents are in capability subclass VIs, and the Grigsby soil is in capability class IIw.

VaF—Varilla-Jefferson-Alticrest complex, 35 to 75 percent slopes, very rocky

These steep and very steep soils are on the southeast-facing side of Pine Mountain in deeply incised ravines. The Varilla and Jefferson soils are very deep, and the Alticrest soil is moderately deep. The Varilla and Alticrest soils are somewhat excessively drained. The Jefferson soil is well drained. The elevations near the mountain crest range from about 2,000 to 3,000 feet. The higher elevations receive more snow during the winter than the lower elevations and may receive more rainfall during the summer. Near the base of the mountain, the elevations are 1,000 to 1,600 feet. The slope into the ravines is linear or slightly concave, except where broken by small cliffs or ledges of sandstone. Across the slope, the shape is mainly linear but is broken by cliffs or ledges and small ravines. Most streams in the ravines flow all year and are fed by seeps and smaller streams. In places, sandstone rock outcrops and cliffs make up about 8 percent of the map unit. Stones and boulders cover about 0.1 to 15.0 percent of the surface. Most areas are long and narrow and range from 20 to 100 acres in size.

Varilla soil makes up about 40 percent of mapped areas, Jefferson soil about 25 percent, and Alticrest soil about 15 percent. Included minor soils make up about 12 percent, and the remaining 8 percent is rock outcrops and cliffs. These soils are in a regular repeating pattern on the landscape, but they are so intermingled that they could not be separated at the scale chosen for mapping.

Typically, the surface layer of the Varilla soil is very dark grayish brown channery sandy loam about 3 inches thick. The subsoil extends to a depth of about 65 inches. The upper part, to a depth of about 14 inches, is yellowish brown channery sandy loam. The middle part, to a depth of about 35 inches, is very channery sandy loam. The lower part of the subsoil is yellowish brown extremely channery sandy loam. The substratum is extremely channery loamy sand to a depth of more than 75 inches. In some areas, the surface layer and subsoil are very channery silt loam. In other areas, depth to bedrock ranges from 40 to 60 inches.

The Varilla soil is low in natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is low. Surface runoff is medium. The root zone is very deep, but rock fragments often restrict penetration. Depth to bedrock is greater than 60 inches.

Typically, the surface layer of the Jefferson soil is very dark brown and dark yellowish brown loam about 4 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown loam and channery loam. The middle part, to a depth of about 34 inches, is strong brown channery loam. The lower part of the subsoil is reddish yellow and yellowish brown channery and very channery loam. In some areas, the surface layer is sandy loam. In other areas, depth to bedrock ranges from 40 to 60 inches.

The Jefferson soil is low in natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The root zone is very deep and easily penetrated. Depth to bedrock is greater than 60 inches.

Typically, the surface layer of the Alticrest soil is dark grayish brown sandy loam about 3 inches thick. The subsoil is yellowish brown sandy loam. The substratum is weathered sandstone. Sandstone bedrock is at a depth of 38 inches. In some areas, the surface layer is loam. In other areas, it has more rock fragments.

The Alticrest soil is low in natural fertility and low or moderate in organic matter content. Permeability is moderately rapid, and the available water capacity is moderate. Surface runoff is medium, and the root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping on narrow knolls and nose slopes are small areas of Gilpin, Shelocta, and Wallen soils. Holly soils are along some of the narrow drainageways. Individual areas of the minor soils commonly are less than 5 acres in size.

The major soils are unsuited to pasture, hay, and row crops because of steep slopes, an equipment limitation, and the hazard of erosion.

These soils are in woodland consisting of secondary growth hardwood forest. They are suited to woodland. Chestnut oak, white oak, black oak, scarlet oak, and red maple are common trees. Eastern white pine, Virginia pine, shortleaf pine, and black oak are suitable trees for planting.

The major management concerns for growing timber on these soils are an equipment limitation, plant competition, seedling mortality, and the hazard of erosion. Erosion along haul roads and skid trails can be reduced by establishing a grade of less than 10 percent along the roads and trails and by limiting the area of disturbance to 10 percent or less on a given site. Water bars, culverts, and gravel can protect permanent access roads. Rock outcrop and steep slopes restrict the use of wheeled and tracked equipment and may cause breakage and hinder

yarding. In many areas, roads cannot be built because of cliffs.

These soils are unsuited to urban uses because of steep slopes, an equipment limitation, and depth to bedrock.

These Varilla, Jefferson, and Alticrest soils are in capability class VIIe.

W—Water

This map unit consists mostly of Carr Fork Lake in Knott County and other small bodies of water scattered throughout the survey area.

Carr Fork Lake accounts for 711 acres of water in Knott County. An additional 57 acres is made up of small lakes and sediment ponds.

Fishpond Lake accounts for about 35 acres and Elkhorn Lake about 20 acres in Letcher County. An additional 10 acres is made up of the Cumberland and Kentucky Rivers.

This map unit is not assigned a land capability classification.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed below. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

About 3,000 acres in Knott County and about 4,000 acres in Letcher County meet or have the potential to meet the requirements for prime farmland. Most areas of prime farmland in this soil survey are on valley floors that are occasionally flooded. The primary crops grown on the prime farmland are corn, hay, and pasture. In places, prime farmland has been converted to urban and industrial uses by filling flood plains.

Gr Grigsby sandy loam, occasionally flooded
Hy Holly loam, frequently flooded (where drained and protected from flooding)
RgB Rowdy-Grigsby complex, 0 to 4 percent slopes, occasionally flooded

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others 1979; U.S. Army Corps of Engineers 1987; National Research Council 1995; Tiner 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register 1995). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff 1998) and in the "Soil Survey Manual" (Soil Survey Division Staff 1993).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" (USDA 1996).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

The following map unit meets the definition of hydric soils and, in addition, has at least one of the hydric soil indicators. This information can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council 1995; USDA 1996a).

Hy Holly loam, frequently flooded

Map units that are made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The following map units, in general, do not meet the definition of hydric soils because they do not have one of the hydric soil indicators. A portion of these map units, however, may include hydric soils. Onsite investigation is recommended to determine whether hydric soils occur and the location of the included hydric soils.

Gr Grigsby sandy loam, occasionally flooded
GuB Grigsby-Urban land complex, 0 to 6 percent slopes, occasionally flooded
RgB Rowdy-Grigsby complex, 0 to 4 percent slopes, occasionally flooded

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand, gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

About 5,000 acres, or about 1 percent of the survey area, is used for crops and pasture. Of this total, about one-third is used for crops, mainly corn, hay, and potatoes. Other crops are vegetables, small fruits, tree fruits, and nursery plants. A small acreage is used for tomatoes, strawberries, blackberries, melons, sweet corn, peppers, cabbage or other vegetables, and small fruits. Apples and peaches are the most important tree fruits grown in the survey area. The acreage used for crops and pasture has steadily decreased in the last 20 years. Most steep hillsides that were once used for corn or pasture have reverted to woodland, and other areas have been converted to urban uses.

The potential of the soils for increased production is low. Only about 7,000 acres in the survey area meet or have the potential to meet criteria for prime farmland. An additional 2,000 acres is suited to crop production in sloping areas if the soils are adequately protected from erosion. Another 5,000 acres has been surface mined for coal and has favorable topography, but surface stones hinder its use as pasture or hayland.

Production can be increased by applying the latest crop production technology to all of the cropland in the survey area. Differences in suitability and management result from differences in soil characteristics, such as fertility, erodibility, and organic matter content, available water for plant growth, drainage, and flooding. Cropping systems, tillage, and field size are also important parts of management. This section describes the general principles of soil management that can be applied widely within the survey area.

Soil erosion is a major concern on slopes of more than 2 percent. Loss of the surface layer reduces fertility and available water capacity and results in poor

tilth. Erosion is especially harmful to soils that have a root restricting layer within 40 inches of the surface, such as Gilpin and Marrowbone soils. It is less harmful, though still a concern, on soils that have few root-restricting characteristics, such as Allegheny and Rowdy soils. Applications of lime and fertilizer help to offset the lower fertility caused by erosion, but overcoming much of the damage is difficult or impractical with conventional methods. A carefully timed crop rotation that includes crop residue and applications of barnyard manure as fertilizer is preferable to continuous cropping of any kind because it helps to control erosion. Controlling erosion minimizes the pollution of streams by sedimentation and thus improves water quality for farm, city, and recreational uses and for wildlife habitat (Stevenson 1982).

Erosion-control practices provide a protective cover of crop residue or vegetation. Properly managed permanent pasture or hay rotations that alternate cultivated crops and meadows help to control erosion. Applying a system of conservation tillage that leaves a protective cover of crop residue on the surface throughout the year can reduce sheet erosion by one-half or more, as compared to fall plowing with a moldboard plow.

No-tillage systems that leave nearly all of the crop residue on the surface reduce the hazard of erosion. Contour farming and contour stripcropping can be used on fields that have smooth, uniform slopes. Terraces that divert surface runoff to safe outlets can be used in some fields. The use of conservation practices on highly erodible land (HEL) used for cultivated crops has increased due to USDA compliance provisions.

Soil tilth is an important factor affecting the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous. On valley floors, most soils used for cultivated crops have a surface layer of loam or sandy loam that is moderate in organic matter content. Examples are Grigsby and Rowdy soils. Generally, tilling these soils weakens the soil structure and increases the degree of compaction and the extent of surface crusting. Tilling when the soils are too wet can further increase the degree of compaction, even below the plow layer. Subsoiling and varying the depth of plowing minimize compaction and the formation of traffic pans. Regular additions of crop residue, barnyard manure, and other organic materials improve tilth and minimize surface crusting.

Soil fertility is medium in most of the soils on the valley floors and low in most of the soils on uplands. Rayne and Shelocta soils are examples of upland soils that have medium natural fertility. Almost all of the soils on uplands are moderately acid or strongly acid in the upper part of the root zone. Applications of lime are needed to raise the pH level of these soils for the adequate growth of most crops. Most of the soils on flood plains are slightly acid or moderately acid. On all soils, the level of lime and fertilizer applied should be based on the results of soil tests, the needs of the crops, and the expected level of yields. The Cooperative Extension Service can help to determine the kind and amount of lime and fertilizer to be applied.

Organic matter is an important source of nitrogen for crop growth. In addition, it helps to maintain good tilth and a proper rate of water infiltration. The content of organic matter is moderate in the soils on valley floors. Soils throughout the survey area have low levels of phosphorus (Khasawneh, Sample, and Kamprath 1980) and low or moderate levels of potassium (Munson 1985) unless heavy applications of fertilizer have been applied.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared

with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forestland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by the numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, forestland, wildlife habitat, or recreation.

The acreage of soils in each capability class or subclass is shown in table 6. The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Knott and Letcher Counties are in the mixed mesophytic forest region of the eastern deciduous forest, an area characterized by steep slopes and narrow valleys. Except for small areas of pasture and surface mines, the dominant tree species are maple, yellow-poplar, oak, and hickory. Forestland dominates the landscape, covering nearly all the survey area. The oak-hickory forest is the major type found in both counties, comprising approximately 85 percent of the forestland acreage. The lesser forest types, which make up 15 percent of the acreage, are pines and northern hardwoods. Sawtimber stands make up 55 percent of the forestland acreage, poletimber 36 percent, and saplings and seedlings 9 percent.

Currently there are several sawmills operating in the survey area. Forest products include rough sawn lumber, shims, blocking, pine posts, and mine timbers. Some landowners allow cutting of mine timbers and fuel wood in small quantities.

Most stands have the capability of growing 50 cubic feet of wood per acre annually, but average net growth is 31 cubic feet per acre. Many forested areas are understocked with trees or have a high percentage of low-quality trees per acre. Several factors tend to prevent good forest management. Many landowners own forestland for 10 years or less and for purposes other than timber production. Logging practices that

remove only the highest grades of timber often leave poor stocks for forest regeneration. Tract size and owner objectives also affect management decisions.

Approximately 6 percent of the forest acreage in the survey area is classified as having very good yearly site productivity (120 or more cubic feet per acre), 16 percent is classified as good (85 to 119 cubic feet per acre), 45 percent is fair (50 to 84 cubic feet per acre), and 33 percent is poor (20 to 49 cubic feet per acre).

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed.

In the table, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability (Nelson, Clutter, and Chaiken 1961; Olson 1959).

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil.

Trees to plant are those that are suitable for commercial wood production.

Soil and Tree Relationships

A knowledge of the soil helps to provide a basic understanding of the distribution of tree species on the

landscape and tree growth. Some of these relationships are readily recognized. For example, yellow-poplar grows well on deep or very deep, moist soils but scarlet oak and chestnut oak or pitch pine and Virginia pine are common where the rooting depth is restricted or the moisture supply is limited. The soil serves as a reservoir for moisture, provides an anchor for roots, and supplies most of the available nutrients. Soil properties that directly or indirectly affect these growth requirements include organic matter content, reaction, fertility, drainage, texture, structure, soil depth, and landscape position. Elevation and aspect are of particular importance in mountainous areas.

The available water capacity is primarily influenced by texture, organic matter content, rooting depth, and content of rock fragments. In this survey area, available water capacity is a limitation affecting tree growth only in the shallow soils, such as Ramsey soils, because of the fairly even and abundant summer rainfall. Changing the physical limitation of the soils is difficult, but timber stand improvement and thinning are useful in management.

The available supply of nutrients affects tree growth. Mineral horizons in the soil are important. Mineralization of humus releases nitrogen and other nutrients to plants. Calcium, magnesium, and potassium are held within the humus. Very small amounts of these nutrients are made available by the weathering of clay and silt particles. Most of the soils in the uplands have been leached and have only small amounts of these nutrients below the surface layer. Where the surface layer is thin, as in Handshoe and Marrowbone soils, careful management is needed during site preparation to ensure that the surface layer is not removed or degraded (Simonson 1959).

The living plant community is part of the nutrient reservoir. The decomposition of leaves, stems, and other organic materials recycles the nutrients that have accumulated in the forest ecosystem. Fire, excessive trampling by livestock, and erosion can result in the loss of these nutrients. Forest management should include some prevention of wildfires and protection from overgrazing.

Aspect and landscape position influence the amount of available sunlight, air drainage, soil temperature, and moisture retention. North- and east-facing slopes (cool slopes) are better suited to tree growth than south- and west-facing slopes (warm slopes). Most of the soils with cool aspect have an A horizon that is thicker and has more humus and clay than that of soils on the warm slopes. An example of soils on a cool slope is Kimper soils. These soils have a slightly higher capacity to hold water and a much higher capacity to hold nutrients than soils with warm aspect. The mean annual soil temperature is about 2 degrees F lower in areas with cool aspect. The difference in temperature is most prevalent during the dormant season. Because less sunlight falls on the canopy in areas of cool aspect, the air temperature in the canopy and the transpiration rate are lower, therefore less water is transpired.

Soils on lower slopes may receive additional water because of internal flow. On the very steep uplands, much of the water movement during periods of saturation occurs as lateral flow within the subsoil.

Soil and air temperature are lower on the upper slopes than on the lower slopes. The temperature change is about 1 degree per 550 feet change in elevation. Soils at the base of a hillside with warm aspect receive a shading effect from hillsides with cool aspect. Because the drainageways between them are so deeply incised, receive little sunlight in winter, and have much cool air drainage at night, a "spillover" of cool aspect soils is generally seen as far as 100 feet above the drainageway or valley floor onto the base of the hillside with warm aspect. This pattern was used to make separations in mapping in this survey. The result is that soil lines that divide hillsides follow the drainageways, but are mostly located on the bases of hillsides with warm aspect.

Nutrients, water, and landscape position largely determine which tree species grow on a particular soil. For example, a sugar maple-basswood forest has the highest fertility level and moisture content requirement (Muller 1982). Beech grows on soils that have a high moisture content and an intermediate fertility level. A chestnut oak-red maple forest is on soils that have low fertility and low moisture availability.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area, and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In

planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Knott and Letcher Counties have valuable fish and wildlife resources. Streams, rivers, and constructed impoundments provide habitat for fish and waterfowl. Habitat for wildlife is scattered throughout the survey area in the mixed forestland and openland.

Some of the soils in Knott and Letcher Counties are suitable for impounding water. Ponds, small streams, and large impoundments are stocked and managed for largemouth bass, channel catfish, bluegill, walleye, striped bass, and rainbow trout. Carr's Fork Lake and Fishpond Lake are the only major man-made impoundments of any size in the survey area.

Very little aquaculture exists in the survey area. Expansion of aquaculture will depend upon adequate water supplies, improvement of water quality, and market conditions.

The major game species of wildlife in the survey area include white-tailed deer, gray squirrel, cottontail rabbit, ruffed grouse, raccoon, gray fox, and red fox. Bobwhite quail and mourning dove occur in limited numbers. Eastern wild turkey, white-tailed deer, and elk are being managed for increased populations in all eastern Kentucky counties.

Waterfowl are commonly found in the survey area during the migration period. Species include mallard, teal, widgeon, and Canada geese. Wood ducks are the more permanent waterfowl residents, commonly nesting along the North Fork of the Kentucky River and some of the larger streams in the survey area.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting the appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in

determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The

ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope (fig. 22). The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

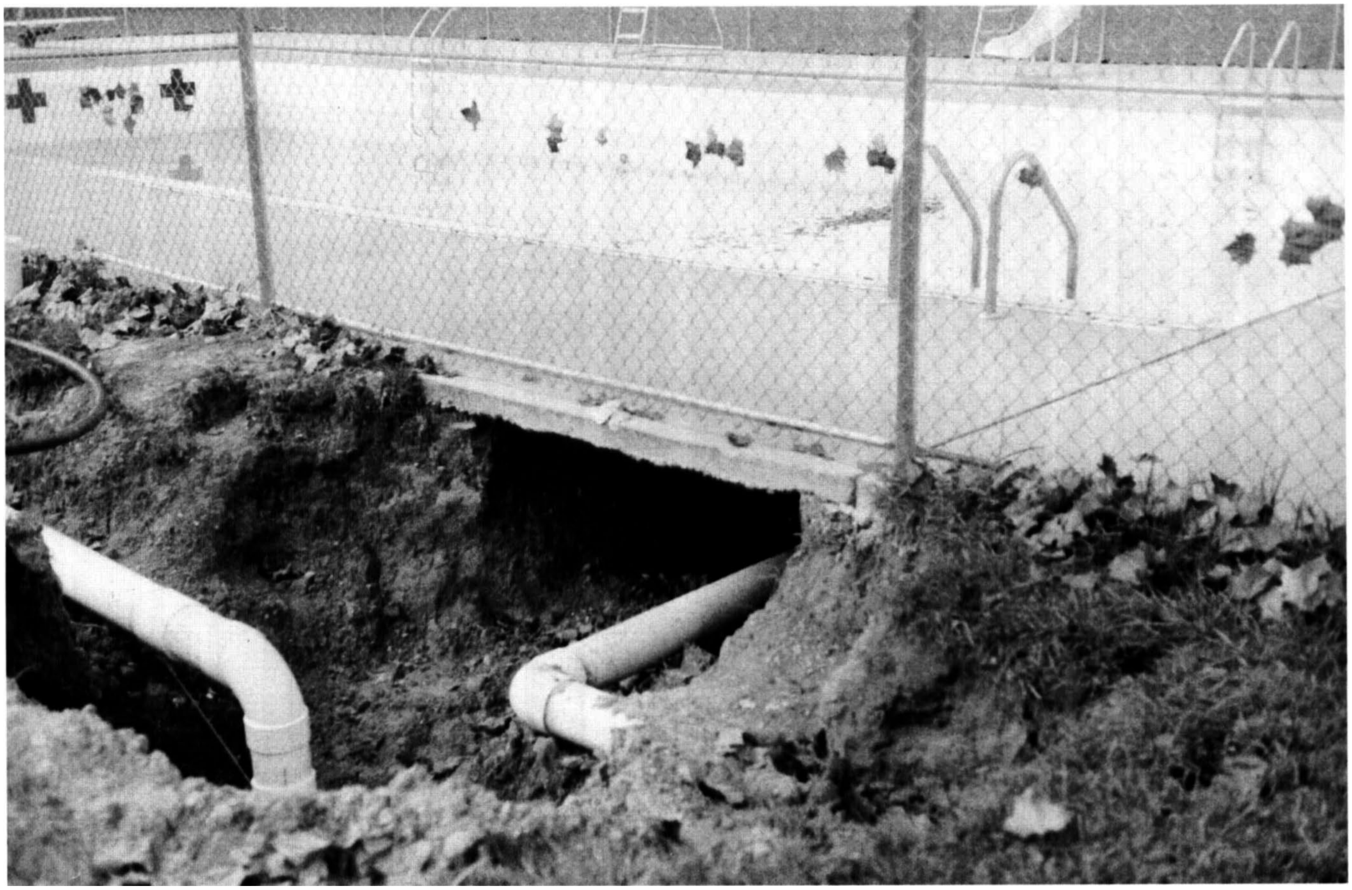

Figure 22.—The lack of stones and boulders make excavation and construction relatively easy in areas of Allegheny loam, 2 to 15 percent slopes. Repairs to this swimming pool were accomplished using minimal equipment.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for

use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area. Most soils have layers of contrasting properties within 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated

sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The

classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, 6 to 9 percent; and *very high*, more than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates

are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of some typical pedons in the survey area are given in table 17 and the results of chemical analysis in table 18. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series. They are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the University of Kentucky, Agricultural Experiment Station, Lexington, Kentucky.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (USDA 1996b).

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).
Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).
Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).
Organic matter—using "Van Bemmelon conversion factor" (6A1a).
Extractable acidity—barium chloride-triethanolamine IV (6H1a).
Cation-exchange capacity—sum of cations (5A3a).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).
Reaction (pH)—1:1 water dilution (8C1f).
Available potassium—60sz. SMP buffer (8D7).
Extractable phosphorus—Bray P-1 (6S6).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Allegheny Series

The Allegheny series consists of very deep, well drained soils that formed in mixed alluvium weathered from sandstone, siltstone, and shale. Permeability is moderate. These soils are on stream terraces of rivers and their major tributaries throughout the survey area.

Slopes are smooth and convex and range from 2 to 15 percent. Allegheny soils are fine-loamy, mixed, mesic Typic Hapludults.

Allegheny soils are associated on the landscape with Grigsby, Holly, and Rowdy soils. Grigsby, Holly, and Rowdy soils do not have argillic horizons. Grigsby soils are on flood plains and are coarse-loamy. Holly soils are on flood plains and are poorly drained.

Typical pedon of Allegheny loam, 2 to 15 percent slopes; on a pastured stream terrace in a bend of Troublesome Creek on the campus of Camp Nathanael, 0.25 mile southwest of Emmalena, in Knott County; USGS Carrie quadrangle; lat. 37 degrees 19 minutes 58 seconds N. and long. 83 degrees 04 minutes 48 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) loam; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—7 to 27 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; very few very fine roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—27 to 44 inches; brownish yellow (10YR 6/6) loam; moderate medium subangular blocky structure; friable; very few very fine roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

BC—44 to 72 inches; brownish yellow (10YR 6/6) loam; weak coarse subangular blocky structure; firm; very few very fine roots; common fine faint yellow (10YR 7/6) and few fine distinct yellowish brown (10YR 5/8) soft irregular masses of iron accumulation with diffuse boundaries in the matrix; very strongly acid; clear smooth boundary.

C—72 to 80 inches; brownish yellow (10YR 6/6) clay loam; massive; very firm; very few very fine roots; common fine prominent strong brown (7.5YR 5/8) soft irregular masses of iron accumulation with sharp boundaries and few fine prominent light gray (10YR 7/2) iron depletions with diffuse boundaries in the matrix; very strongly acid.

Solum thickness ranges from 30 to 80 inches or more. Depth to bedrock ranges from 60 to 120 inches or more. The content of pebbles and sandstone channers ranges from 0 to 5 percent in the A horizon, from 0 to 20 percent in the Bt horizon, and from 0 to 35 percent in the BC and C horizons. Reaction ranges from strongly acid to extremely acid, unless the soil has been limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. The fine-earth texture is loam, silt loam, or fine sandy loam. Subhorizons of sandy loam are in the lower part of some Bt horizons, and most pedons have redoximorphic features in shades of brown, red, yellow, or gray below a depth of 40 inches.

The BC and C horizons have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. The fine-earth texture is sandy loam, loam, sandy clay loam, or clay loam.

Alticrest Series

The Alticrest series consists of moderately deep, well drained soils that formed in residuum weathered from sandstone. Permeability is moderately rapid. These soils are on narrow ridges and in deeply incised ravines on the southeast-facing side of Pine Mountain in southern Letcher County. Slopes range from 20 to 75 percent. Alticrest soils are coarse-loamy, siliceous, mesic Typic Dystrochrepts.

Alticrest soils are associated on the landscape with Helechawa, Jefferson, Ramsey, Varilla, and Wallen soils. Wallen and Varilla soils are loamy-skeletal. Jefferson soils are fine-loamy. Ramsey soils are shallow. Helechawa soils are deep.

Typical pedon of Alticrest sandy loam in an area of Alticrest-Ramsey-Wallen complex, 20 to 55 percent slopes, rocky; on a wooded nose slope on Pine Mountain, 200 feet east of Kentucky Highway 119, about 300 feet west of Presley House Branch, 5 miles south of Whitesburg, in Letcher County; USGS Whitesburg quadrangle; lat. 37 degrees 04 minutes 13 seconds N. and long. 82 degrees 48 minutes 04 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 3 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; common fine and few medium roots; 5 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw1—3 to 13 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; few fine tubular pores; 5 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw2—13 to 25 inches; yellowish brown (10YR 5/8) channery sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; 15 percent sandstone channers; very strongly acid; clear smooth boundary.

Cr—25 to 30 inches; weathered sandstone; abrupt smooth boundary.
R—30 inches; sandstone bedrock.

Solum thickness and depth to bedrock range from 20 to 40 inches. The content of sandstone channers or quartzite pebbles, less than 3 inches in diameter, ranges from 0 to 15 percent in individual horizons. Reaction is very strongly acid or strongly acid, unless the soil has been limed.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. The fine-earth texture is sandy loam.

The AB, BA, and E horizons, if they occur, have hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The fine-earth texture is sandy loam or loam.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 4 to 8. The fine-earth texture is sandy loam or loam.

The bedrock is slightly weathered sandstone.

Berks Series

The Berks series consists of moderately deep, well drained soils that formed in loamy residuum weathered from siltstone and fine-grained sandstone. Permeability is moderate or moderately rapid. These soils are on the northwest-facing side of Pine Mountain in southern Letcher County, bordering Pike County. Slopes range from 50 to 120 percent. Berks soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Berks soils are associated on the landscape with Caneyville and Marrowbone soils and areas of rock outcrop. Caneyville soils are clayey, and Marrowbone soils are coarse-loamy.

Typical pedon of Berks channery silt loam in an area of Berks-Rock outcrop-Marrowbone complex, 60 to 120 percent slopes; on a wooded, east-facing side slope, about 0.5 mile south of Marrowbone, in Pike County; USGS Hellier quadrangle; lat. 37 degrees 21 minutes 23 seconds N. and long. 82 degrees 24 minutes 43 seconds W.

Oi—1 inch to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.
A—0 to 3 inches; dark brown (10YR 3/3) channery silt loam; moderate medium granular structure; friable; common fine to coarse roots; 20 percent siltstone channers 0.1 inch to 6 inches long; very strongly acid; clear wavy boundary.
BA—3 to 7 inches; dark yellowish brown (10YR 4/4) very channery silt loam; moderate medium subangular blocky structure; friable; few fine to coarse roots; 40 percent siltstone and fine-grained sandstone channers 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.
Bw1—7 to 17 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; friable; few medium roots; 45 percent siltstone and fine-grained sandstone channers 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.
Bw2—17 to 27 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; friable; few medium roots; 50 percent siltstone and fine-grained sandstone channers 0.1 inch to 6 inches long; very strongly acid; abrupt smooth boundary.
R—27 inches; interbedded fine-grained sandstone and siltstone.

Solum thickness ranges from 18 to 40 inches, and depth to bedrock ranges from 20 to 40 inches. Rock fragments of siltstone or fine-grained sandstone make up 10 to 50 percent of the A horizon and 15 to 75 percent of the B horizon. Some pedons have a C horizon that has 35 to 90 percent rock fragments. The weighted average of rock fragments is 35 percent or more in the particle-size control section. Reaction ranges from extremely acid to slightly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. The fine-earth texture is silt loam.

The BA and Bw horizons have hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. The fine-earth texture is silt loam or loam.

Some pedons have a C horizon. This horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6. The fine-earth texture is silt loam or loam.

The bedrock is commonly fractured fine-grained sandstone or siltstone.

Bledsoe Series

The Bledsoe series consists of very deep, well drained soils that formed in mixed colluvium weathered from limestone, siltstone, sandstone, and shale. Permeability is moderately slow in the solum and moderately slow or slow in the substratum. These soils are in drainageways, on backslopes, and on benches on the middle slopes of the northwest-facing side of Pine Mountain in southern Letcher County. Slopes are linear or slightly concave and range from 50 to 80 percent. Bledsoe soils are fine, mixed, mesic Typic Hapludalfs.

Bledsoe soils are associated on the landscape with Caneyville and Renox soils. Renox soils are fine-loamy. Caneyville soils are moderately deep.

Typical pedon of Bledsoe silt loam in an area of Caneyville-Renox-Bledsoe complex, 50 to 80 percent slopes, extremely stony; on a wooded, benched side slope on the scarp face of Pine Mountain, 100 feet south of Scuttle Hole Gap Road, about 2 miles south of Whitesburg, in Letcher County; USGS Whitesburg quadrangle; lat. 37 degrees 03 minutes 32 seconds N. and long. 82 degrees 51 minutes 35 seconds W.

Oi—4 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine and medium subangular blocky and granular structure; very friable; many fine roots; 2 percent limestone channers; slightly alkaline; abrupt wavy boundary.

AB—6 to 12 inches; brown (10YR 4/3) silt loam; moderate medium and coarse subangular blocky structure; friable; common fine and medium roots; 5 percent sandstone and limestone channers; neutral; clear wavy boundary.

Bt1—12 to 24 inches; yellowish brown (10YR 5/8) silty clay loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; common faint clay films on faces of peds and on rock fragments; 10 percent sandstone channers; slightly alkaline; clear smooth boundary.

Bt2—24 to 33 inches; strong brown (7.5YR 5/6) silty clay; moderate fine and medium subangular and angular blocky structure; friable; common fine and medium roots; few fine tubular pores; common faint clay films on faces of peds; 10 percent sandstone channers; neutral; clear smooth boundary.

Bt3—33 to 43 inches; strong brown (7.5YR 5/6) silty clay; moderate medium and coarse subangular blocky structure; firm; few fine roots; common faint clay films on faces of peds; 5 percent sandstone channers; slightly acid; clear smooth boundary.

2BC—43 to 66 inches; strong brown (7.5YR 4/6) very flaggy clay; moderate coarse subangular blocky structure; firm; few fine roots; 30 percent limestone flagstones and 10 percent limestone channers; slightly alkaline; gradual smooth boundary.

2C—66 to 80 inches; strong brown (7.5YR 4/6) very flaggy clay; massive; firm; very few very fine roots; 35 percent limestone flagstones and 5 percent limestone channers; slightly alkaline.

Solum thickness ranges from 48 to more than 72 inches. Depth to soft shale or siltstone is more than 60 inches. The content of limestone, sandstone, and siltstone channers ranges from 0 to 25 percent to a depth of about 40 inches. The content of limestone channers and flagstones ranges from 0 to 60 percent below a depth of 40 inches. Reaction ranges from moderately acid to slightly alkaline.

The A and AB horizons have hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The fine-earth texture is silt loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. The fine-earth texture is silty clay loam, silty clay, or clay.

The 2BC and 2C horizons and the BC and C horizons, if they occur, have colors similar to the Bt horizon. The fine-earth texture is silty clay or clay. Some pedons have redoximorphic features in shades of red, brown, or gray below a depth of 40 inches.

Caneyville Series

The Caneyville series consists of moderately deep, well drained soils that formed in residuum weathered from limestone. Permeability is moderately slow. These soils are on convex side slopes intermingled with limestone rock outcrop on the northwest-facing side of Pine Mountain in Letcher County. Slopes are linear or slightly concave and range from 50 to 120 percent but are mostly 50 to 80 percent. Caneyville soils are fine, mixed, mesic Typic Hapludalfs.

Caneyville soils are associated on the landscape with Berks, Bledsoe, and Renox soils. Berks soils are loamy-skeletal. Renox soils are fine-loamy. Bledsoe soils are very deep.

Typical pedon of Caneyville silty clay loam in an area of Caneyville-Renox-Bledsoe complex, 50 to 80 percent slopes, extremely stony; on a wooded side slope on the scarp face of Pine Mountain, 25 feet upslope of Scuttle Hole Gap Road in Big Cowan Creek, 2 miles south of Whitesburg, in Letcher County; USGS Whitesburg quadrangle; lat. 37 degrees 03 minutes 31 seconds N. and long. 82 degrees 51 minutes 34 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) silty clay loam; moderate fine granular structure; friable; common fine and medium and few coarse roots; 10 percent limestone channers; neutral; clear wavy boundary.

AB—3 to 8 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; firm; common fine and medium roots and few coarse roots; 10 percent limestone channers; neutral; clear smooth boundary.

BA—8 to 21 inches; yellowish brown (10YR 5/4) silty clay loam; strong fine subangular blocky structure; firm; common fine and medium roots; 5 percent limestone channers; neutral; clear smooth boundary.

Bt1—21 to 27 inches; strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm; few fine and medium roots; few faint clay films on faces of peds; 5 percent limestone channers; slightly alkaline; abrupt smooth boundary.

Bt2—27 to 33 inches; yellowish red (5YR 4/6) clay; few fine distinct strong brown (7.5YR 5/6) lithochromic mottles; moderate medium and coarse subangular blocky structure; firm; few fine and few medium roots; few faint clay films on faces of peds; 5 percent limestone channers and 1 percent siltstone channers; slightly alkaline; clear smooth boundary.

Bt3—33 to 36 inches; yellowish red (5YR 4/6) clay; moderate medium and coarse subangular blocky structure; very firm; very few very fine roots; few faint clay films on faces of peds; 1 percent limestone channers; slightly alkaline; abrupt wavy boundary.

R—36 inches; slightly weathered limestone bedrock.

Solum thickness ranges from 20 to 40 inches. The content of limestone, chert, siltstone, or sandstone fragments ranges from 0 to 15 percent in the upper part of the solum and from 0 to 35 percent in the lower part of the solum, immediately above bedrock. Reaction ranges from very strongly acid to neutral in the upper part of the solum and from moderately acid to slightly alkaline in the lower part.

The A and AB horizons have hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. The fine-earth texture is silt loam or silty clay loam.

The BA horizon has hue of 10YR to 5YR, value of 5 or 6, and chroma of 4 to 6. The fine-earth texture is silt loam or silty clay loam.

The Bt horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 4 to 8. The fine-earth texture is silty clay loam, silty clay, or clay.

Some pedons have BC and C horizons. These horizons have colors similar to the Bt horizon. The fine-earth texture is silty clay or clay.

The bedrock is slightly weathered calcareous shale or limestone.

Cloverlick Series

The Cloverlick series consists of very deep, well drained soils that formed in mixed colluvium weathered from sandstone, siltstone, and shale. Permeability is moderate. These soils are in coves, along drainageways, on benches, on concave side slopes, and on footslopes with dominantly cool aspects throughout the survey area. Slopes are complex and range from 20 to 80 percent. Cloverlick soils are loamy-skeletal, mixed, mesic Umbric Dystrochrepts.

Cloverlick soils are associated on the landscape with Fairpoint, Fiveblock, Guyandotte, Highsplint, Kaymine, Kimper, Renox, and Shelocta soils. Guyandotte soils have a thicker and darker epipedon. Highsplint soils have a thinner and lighter colored epipedon. Kimper, Renox, and Shelocta soils are fine-loamy. Fairpoint, Fiveblock, and Kaymine soils formed in nonacid regolith in areas surface mined for coal.

Typical pedon of Cloverlick channery loam in an area of Cloverlick-Kimper-Highsplint complex, 30 to 65 percent slopes, very stony (fig. 23); on a wooded side slope, 25 feet west of an unimproved road in Stillhouse Branch, 5 miles south of Carrie, in Knott County; USGS Carrie quadrangle; lat. 37 degrees 20 minutes 41 seconds N. and long. 83 degrees 04 minutes 56 seconds W.

Oi—5 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) channery loam, brown (10YR 5/3) dry; weak medium granular structure; very friable; many fine, medium, and coarse roots; 15 percent sandstone channers; strongly acid; abrupt wavy boundary.

Bw1—9 to 19 inches; yellowish brown (10YR 5/6) very channery loam; weak fine subangular blocky structure; friable; common fine and medium roots; 50 percent sandstone channers and 5 percent sandstone flagstones; moderately acid; gradual smooth boundary.

Bw2—19 to 35 inches; yellowish brown (10YR 5/6) very channery loam; moderate medium and coarse subangular blocky structure; friable; few fine and medium roots; few fine tubular pores; 45 percent sandstone channers; moderately acid; clear smooth boundary.

Bw3—35 to 44 inches; yellowish brown (10YR 5/4) very flaggy loam; moderate medium subangular blocky structure; friable; few fine roots; 50 percent sandstone flagstones and 10 percent sandstone channers; moderately acid; gradual smooth boundary.

Bw4—44 to 55 inches; yellowish brown (10YR 5/6) very channery loam; weak fine subangular blocky structure; friable; few fine roots; 55 percent sandstone channers; moderately acid; gradual smooth boundary.

Bw5—55 to 67 inches; yellowish brown (10YR 5/6) very channery loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; 60 percent sandstone channers; strongly acid; gradual smooth boundary.
BC—67 to 80 inches; yellowish brown (10YR 5/6) very channery loam; weak medium subangular blocky structure; firm; few fine roots; few fine prominent strong brown (7.5YR 5/8) soft irregular masses of iron accumulation with diffuse boundaries in the matrix; 50 percent sandstone channers; very strongly acid.

Solum thickness ranges from 40 to 80 inches or more. Depth to bedrock ranges from 60 to 100 inches or more. The content of gravel, channers, and flagstones makes up 5 to 50 percent of the A horizon, 15 to 70 percent of individual Bw horizons, and 35 to 90 percent of the BC and C horizons. Reaction is commonly moderately acid to extremely acid. In some pedons, however, the A horizon is slightly acid.

The A horizon has hue of 10YR and value and chroma of 2 or 3. The fine-earth texture is loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is silt loam or loam.

The BC and C horizons, if they occur, have hue of 10YR, value of 4 to 6, and chroma of 2 to 6. Some pedons have redoximorphic features or lithochromic mottles in shades of brown, olive, or gray below a depth of 40 inches. The fine-earth texture is silt loam, loam, or sandy loam.

Cloverlick soils in this survey area are considered taxadjuncts to the series because they have significant increases in clay content in the upper part of the subsoil compared to the surface and lower subsoil layers. This difference, however, does not affect use and management of the soils.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils that formed in either residuum or colluvium weathered from sandstone. Permeability is rapid. These soils are on sharp crests, nose slopes, and head slopes on ridgetops throughout most of the survey area and on nose slopes and convex side slopes with dominantly warm aspects on Black Mountain. Slopes are convex and range from 20 to 80 percent. Dekalb soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Dekalb soils are associated on the landscape with Fairpoint, Fiveblock, Gilpin, Highsplint, Kaymine, Marrowbone, Rayne, and Shelocta soils. Gilpin, Rayne, and Shelocta soils are fine-loamy. Marrowbone soils are coarse-loamy. Highsplint soils are very deep. Fairpoint, Fiveblock, and Kaymine soils are very deep and formed in nonacid regolith in areas surface mined for coal.

Typical pedon of Dekalb channery sandy loam in an area of Dekalb-Gilpin-Rayne complex, 25 to 65 percent slopes, very rocky; on a wooded nose slope at the head of Beech Creek, 200 feet north of a shelter in a cemetery, 1 mile northwest of Emmalena, in Knott County; USGS Carrie quadrangle; lat. 37 degrees 20 minutes 57 seconds N. and long. 83 degrees 05 minutes 06 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.
A—0 to 2 inches; very dark grayish brown (10YR 3/2) channery sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 20 percent sandstone channers; very strongly acid; abrupt wavy boundary.
Bw1—2 to 10 inches; yellowish brown (10YR 5/6) channery sandy loam; weak fine subangular blocky structure; very friable; common fine and medium roots and few coarse roots; 25 percent sandstone channers; strongly acid; clear wavy boundary.
Bw2—10 to 19 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; 50 percent sandstone channers; strongly acid; clear smooth boundary.
Bw3—19 to 25 inches; yellowish brown (10YR 5/4) very channery sandy loam; moderate fine subangular blocky structure; friable; common fine roots; 50 percent sandstone channers and 10 percent sandstone flagstones; strongly acid; abrupt wavy boundary.
R—25 inches; fractured sandstone.

Solum thickness and depth to bedrock range from 20 to 40 inches. The content of flat sandstone fragments, 1 to 10 inches across, increases with depth and ranges from 10 to 60 percent in individual horizons of the solum and up to 80 percent in the C horizon. Reaction ranges from extremely acid to strongly acid, unless the soil has been limed.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The fine-earth texture is sandy loam.

The E horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The fine-earth texture is sandy loam or loam.

The Bw horizon has hue of 7.5YR or 10YR, value of

5 to 7, and chroma of 4 to 8. The fine-earth texture is sandy loam or loam.

The BC, CB, and C horizons, if they occur, have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. The fine-earth texture is sandy loam or loamy sand.

The bedrock is gray or brown sandstone of varying hardness and is commonly fractured without displacement.

Fairpoint Series

The Fairpoint series consists of very deep, well drained soils that formed in nonacid regolith from the surface mining of coal. Permeability is moderately slow. The regolith is a mixture of weathered bedrock fragments and partially weathered fine earth. These soils are on ridgetops and hillsides throughout the survey area, except for the northwest-facing side of Pine Mountain. Slopes range from 2 to 70 percent. Fairpoint soils are loamy-skeletal, mixed, nonacid, mesic Typic Udorthents.

Fairpoint soils in this survey area are mapped as an undifferentiated unit with Kaymine and Fiveblock soils, which also formed in nonacid regolith from surface coal mining. Fiveblock soils have rapid permeability and more sand in the control section than Fairpoint soils. Kaymine soils have moderate permeability and less clay in the control section than Fairpoint soils. Fairpoint soils are also associated on the landscape with Cloverlick, Dekalb, Fedscreek, Gilpin, Guyandotte, Handshoe, Highsplint, Kimper, Marrowbone, Rayne, and Shelocta soils. These associated soils did not form in regolith from surface mining. Fedscreek and Marrowbone soils are coarse-loamy. Kimper, Gilpin, Rayne, and Shelocta soils are fine-loamy. Dekalb soils are moderately deep. Cloverlick, Guyandotte, Handshoe, and Highsplint soils have cambic horizons.

Typical pedon of Fairpoint channery silty clay loam in an area of Kaymine, Fairpoint, and Fiveblock soils, benched, 2 to 70 percent slopes, very stony; on a revegetated contour surface mine bench, 1.1 miles southwest of the confluence of Short Branch and Troublesome Creek, 1 mile south of Emmalena, in Knott County; USGS Carrie quadrangle; lat. 37 degrees 19 minutes 10 seconds N. and long. 83 degrees 04 minutes 15 seconds W.

A—0 to 4 inches; very dark gray (7.5YR 3/1) channery silty clay loam, light bluish gray (5B 7/1) dry; weak fine and medium subangular blocky structure parting to weak fine granular; friable; common fine roots; 30 percent sandstone channers; slightly alkaline; clear wavy boundary.

C1—4 to 9 inches; dark gray (N 4/0) channery silty clay loam; massive; firm; few fine and medium roots; 30 percent hard and soft siltstone channers; neutral; gradual smooth boundary.

C2—9 to 21 inches; very dark grayish brown (10YR 3/2) very channery silty clay loam; massive; firm; 35 percent channers (25 percent sandstone and 10 percent siltstone); neutral; gradual smooth boundary.

C3—21 to 43 inches; grayish brown (10YR 5/2) very channery silty clay loam; massive; firm; 45 percent channers (35 percent sandstone and 10 percent siltstone) and few fragments of coal; neutral; gradual smooth boundary.

C4—43 to 65 inches; dark gray (10YR 4/1) very channery silty clay loam; massive; firm; 50 percent channers (35 percent sandstone, 10 percent siltstone, and 5 percent coal); neutral.

Depth to bedrock is more than 60 inches. The content of rock fragments ranges from 20 to 80 percent but averages 35 percent or more in the particle-size control section. The rock fragments are dominantly channers of sandstone, siltstone, shale, and coal, but flagstones and a few boulders are included. Reaction ranges from moderately acid to slightly alkaline in the surface layer and from moderately acid to neutral in the subsoil.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 1 to 6, or it is neutral in hue and has value of 3 to 5. The fine-earth texture is silty clay loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 6, or it is neutral in hue and has value of 4 to 6. The fine-earth texture is clay loam, silt loam, silty clay loam, or loam.

Fedscreek Series

The Fedscreek series consists of very deep, well drained soils that formed in colluvium weathered dominantly from sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are on linear side slopes, benches, and convex footslopes of hillsides with dominantly warm aspect in eastern Knott and Letcher Counties. Slopes are complex and range from 30 to 80 percent. Fedscreek soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Fedscreek soils are associated on the landscape with Fairpoint, Fiveblock, Handshoe, Kaymine, Marrowbone, and Shelocta soils. Dekalb, Fairpoint, Fiveblock, Handshoe, and Kaymine soils are loamy-skeletal. Shelocta soils are fine-loamy. Marrowbone soils are moderately deep. Fairpoint, Fiveblock, and

Kaymine soils formed in nonacid regolith in areas surface mined for coal.

Typical pedon of Fedscreek sandy loam in an area of Fedscreek-Shelocta-Handshoe complex, 30 to 80 percent slopes, very stony; in a road cut on a steep, wooded side slope in the Middle Fork of Quicksand Creek, 2,100 feet northwest of Poplar Gap, 1,000 feet southwest of the Signal Knob lookout tower, 1.7 miles northwest of Handshoe, in Knott County; USGS Handshoe quadrangle; lat. 37 degrees 29 minutes 01 second N. and long. 82 degrees 55 minutes 46 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 3 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; common fine and medium roots; 8 percent sandstone channers; strongly acid; abrupt smooth boundary.

BA—3 to 12 inches; dark yellowish brown (10YR 4/6) sandy loam; weak fine subangular blocky structure; very friable; common fine and medium and few coarse roots; 8 percent sandstone channers; strongly acid; clear smooth boundary.

Bw1—12 to 19 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; very friable; few fine to coarse roots; 8 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw2—19 to 37 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; few fine and medium roots; 8 percent sandstone channers; extremely acid; clear wavy boundary.

Bw3—37 to 61 inches; strong brown (7.5YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; very few very fine roots; common prominent light yellowish brown (10YR 6/4) clay bridging between grains; 8 percent sandstone channers; extremely acid; abrupt smooth boundary.

R—61 inches; slightly weathered sandstone bedrock.

Solum thickness ranges from 40 to 60 inches. Depth to bedrock is more than 60 inches. The content of rock fragments ranges from 5 to 60 percent in individual horizons in the solum and from 15 to 60 percent in the substratum but averages less than 35 percent in the control section. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. The fine-earth texture is sandy loam.

The BA or BE horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 4 to 6. The fine-earth texture is sandy loam or loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. The fine-earth texture is sandy loam or loam. Some pedons have thin silt coatings on surfaces of peds below a depth of about 30 inches.

The BC and C horizons, if they occur, have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. The fine-earth texture is sandy loam, loam, silt loam, or silty clay loam. These horizons typically have thin coatings of silt or clay on surfaces of peds and lithochromic mottles in shades of brown, yellow, red, or gray below a depth of 40 inches.

Fiveblock Series

The Fiveblock series consists of very deep, somewhat excessively drained soils that formed in nonacid regolith from surface mining. Permeability is rapid. These soils are on ridgetops and hillsides throughout the survey area, except for the northwest-facing slope of Pine Mountain. The regolith is a mixture of weathered bedrock fragments and partially weathered fine earth. Slopes range from 0 to 70 percent. Fiveblock soils are loamy-skeletal, mixed, nonacid, mesic Typic Udorthents.

Fiveblock soils in this survey area are mapped as an undifferentiated unit with Fairpoint and Kaymine soils, which also formed in nonacid regolith from surface mining. Fairpoint soils have moderately slow permeability and more clay in the control section than Fiveblock soils. Kaymine soils have moderate permeability and less sand in the control section than Fiveblock soils. Fiveblock soils are also associated on the landscape with Cloverlick, Dekalb, Fedscreek, Gilpin, Guyandotte, Handshoe, Highsplint, Kimper, Marrowbone, Rayne, and Shelocta soils. These associated soils did not form in regolith from surface mining. Fedscreek and Marrowbone soils are coarse-loamy. Gilpin, Kimper, Rayne, and Shelocta soils are fine-loamy. Cloverlick and Guyandotte soils have thick, dark surface layers. Dekalb soils are moderately deep. Handshoe and Highsplint soils have cambic horizons.

Typical pedon of Fiveblock channery sandy loam in an area of Fiveblock and Kaymine soils, 0 to 30 percent slopes, stony; on a revegetated surface mine in a narrow divide on Yellow Mountain between Laurel Fork of Quicksand Creek and Mill Branch of Ball Creek, 2 miles north of Soft Shell, in Knott County; USGS Handshoe quadrangle; lat. 37 degrees 25 minutes 53 seconds N. and long. 82 degrees 56 minutes 27 seconds W.

A—0 to 2 inches; brown (10YR 5/3) channery sandy loam; single grain; loose; many fine roots; 15

percent channers and 5 percent flagstones (95 percent sandstone and 5 percent siltstone); moderately acid; abrupt wavy boundary.

AC—2 to 14 inches; light yellowish brown (10YR 6/4) channery sandy loam; common fine prominent brownish yellow (10YR 6/8) and reddish yellow (7.5YR 6/6) lithochromic mottles; weak fine subangular blocky structure; very friable; common fine roots; 30 percent channers (90 percent sandstone and 10 percent siltstone); moderately acid; clear smooth boundary.

C1—14 to 27 inches; brown (10YR 5/3) very channery sandy loam; common medium prominent brownish yellow (10YR 6/8) lithochromic mottles; massive; firm; few fine roots; 45 percent channers and 5 percent flagstones (90 percent sandstone and 10 percent siltstone); slightly acid; gradual smooth boundary.

C2—27 to 47 inches; grayish brown (10YR 5/2) very channery sandy loam; common fine prominent yellowish brown (10YR 5/6) lithochromic mottles; massive; firm; very few very fine roots; 45 percent channers and 5 percent flagstones (90 percent sandstone and 10 percent coal); neutral; clear smooth boundary.

C3—47 to 52 inches; dark gray (10YR 4/1) very channery sandy loam; common fine prominent brownish yellow (10YR 6/6) lithochromic mottles; massive; firm; 35 percent channers (90 percent sandstone and 10 percent coal); slightly alkaline; clear smooth boundary.

C4—52 to 72 inches; gray (10YR 5/1) very channery sandy loam; few fine distinct pale brown (10YR 6/3) lithochromic mottles; massive; firm; 40 percent channers (90 percent sandstone and 10 percent coal); slightly alkaline.

Depth to bedrock is generally greater than 5 feet and more than 10 feet in places. The content of rock fragments ranges from 15 to 80 percent but averages 35 percent or more in the particle-size control section. The rock fragments are 65 percent or more gray neutral sandstone. The remaining percentage is made up of siltstone, shale, and coal. The rock fragments are dominantly channers, but flagstones, stones, and boulders are included. The fine-earth texture of the control section averages 5 to 18 percent clay. Most pedons have red, brown, yellow, or gray lithochromic mottles in some or all horizons. Reaction ranges from moderately acid to slightly alkaline in all horizons.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 4. The fine-earth texture is sandy loam.

The C horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 6. The fine-earth texture is sandy loam with zones of loamy sand.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils that formed in residuum weathered from interbedded shale, siltstone, and sandstone. Permeability is moderate. These soils are on shoulder slopes, narrow saddles, and rounded summits of ridgetops throughout most of the survey area and on a few convex nose slopes, saddles, and linear side slopes on the ridgetop of Black Mountain. Slopes are linear, convex, or complex and range from 12 to 65 percent. Gilpin soils are fine-loamy, mixed, mesic Typic Hapludults.

Gilpin soils are associated on the landscape with Dekalb, Fairpoint, Fiveblock, Kaymine, Kimper, Marrowbone, Rayne, Shelocta, and Summers soils. Dekalb and Summers soils are loamy-skeletal. Marrowbone soils are coarse-loamy. Rayne and Shelocta soils are deep. Kimper soils are very deep and do not have an argillic horizon. Fairpoint, Fiveblock, and Kaymine soils are very deep and formed in nonacid regolith in areas surface mined for coal.

Typical pedon of Gilpin loam in an area of Dekalb-Gilpin-Rayne complex, 25 to 65 percent slopes, very rocky; on a wooded saddle, 25 feet south of an unimproved road along a ridgetop dividing Crager Branch and the head of Carr Creek, 1.5 miles east of Omaha, in Knott County; USGS Kite quadrangle; lat. 37 degrees 16 minutes 36 seconds N. and long. 82 degrees 48 minutes 32 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt smooth boundary.

A—0 to 2 inches; brown (10YR 5/3) loam; weak fine granular structure; very friable; many fine roots; 8 percent siltstone channers; extremely acid; abrupt smooth boundary.

BE—2 to 8 inches; light yellowish brown (10YR 6/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; 8 percent siltstone channers; extremely acid; clear smooth boundary.

Bt—8 to 20 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; common fine tubular pores; common prominent strong brown (10YR 7/4) clay films on faces of peds; 8 percent siltstone channers; extremely acid; clear smooth boundary.

BC—20 to 28 inches; yellowish brown (10YR 5/6) channery silt loam; common medium prominent pinkish gray (7.5YR 6/2) lithochromic mottles; weak coarse subangular blocky structure; firm; few

fine and medium roots; 20 percent siltstone channers; extremely acid; abrupt smooth boundary.

C—28 to 34 inches; yellowish brown (10YR 5/6) very channery silt loam; common medium prominent pinkish gray (7.5YR 6/2) lithochromic mottles; massive; very firm; very few very fine roots; 55 percent siltstone channers; extremely acid; abrupt smooth boundary.

Cr—34 to 44 inches; soft rippable siltstone bedrock.

Solum thickness ranges from 18 to 38 inches. Rock fragments are dominantly angular to subangular channers of shale, siltstone, and sandstone. The content of rock fragments ranges from 5 to 40 percent in individual horizons in the solum and from 30 to 90 percent in the C horizon. Rippable bedrock is at a depth of 20 to 40 inches. Reaction ranges from strongly acid to extremely acid, unless the soil has been limed.

The A horizon and the Ap horizon, if it occurs, has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. The fine-earth texture is loam.

Most pedons have E, BA, or BE horizons. These horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 5. The fine-earth texture is loam or silt loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. The fine-earth texture is loam, silt loam, or silty clay loam.

The BC horizon has colors and textures similar to the Bt horizon.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 6. The fine-earth texture is loam, silt loam, or silty clay loam.

The bedrock is dominantly thinly bedded, rippable siltstone and sandstone.

Grigsby Series

The Grigsby series consists of very deep, well drained soils that formed in loamy alluvium derived from sandstone, siltstone, shale, and limestone. Permeability is moderately rapid. These soils are on flood plains of rivers and streams throughout the survey area. Slopes are linear or slightly convex and range from 0 to 6 percent. Grigsby soils are coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts.

Grigsby soils are associated on the landscape with Allegheny, Holly, Itmann, and Rowdy soils and Udorthents. Allegheny, Holly, and Rowdy soils are fine-loamy. Allegheny soils are on terraces and are not subject to flooding. Holly soils are poorly drained. Itmann soils formed in waste materials and by-products of coal mining. Udorthents are loamy-skeletal and consist of a mixture of soil and rock material that has been drastically disturbed.

Typical pedon of Grigsby sandy loam in an area of Rowdy-Grigsby complex, 0 to 4 percent slopes, occasionally flooded; in a pasture along Troublesome Creek, 100 feet south of Kentucky Highway 550, about 500 feet northwest of the confluence of Walkers Branch and Troublesome Creek, 3 miles west of Hindman, in Knott County; USGS Carrie quadrangle; lat. 37 degrees 19 minutes 51 seconds N. and long. 83 degrees 02 minutes 27 seconds W.

Ap—0 to 9 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; common fine roots; neutral; clear smooth boundary.

Bw1—9 to 15 inches; dark yellowish brown (10YR 4/4) sandy loam that has few thin strata of light yellowish brown loamy sand; weak fine subangular blocky structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Bw2—15 to 25 inches; brown (10YR 4/3) sandy loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; many thin wormcasts; slightly acid; clear smooth boundary.

Bw3—25 to 44 inches; dark yellowish brown (10YR 4/4) sandy loam that has common (1- to 3-inch-thick) strata of loamy sand; weak medium and coarse subangular blocky structure; friable; few fine roots; slightly acid; clear smooth boundary.

BC—44 to 52 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; slightly acid; clear wavy boundary.

C—52 to 80 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; loose; slightly acid.

Solum thickness ranges from 30 to 60 inches. Depth to bedrock is more than 60 inches. The content of rock fragments, dominantly subrounded sandstone channers and coal fragments, ranges from 0 to 15 percent in the A and B horizons and from 0 to 60 percent in the C horizon. Reaction ranges from moderately acid to neutral throughout the profile.

The Ap horizon has a hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The fine-earth texture is sandy loam.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. The fine-earth texture is sandy loam, fine sandy loam, or loam. Some pedons have redoximorphic features in shades of gray or brown below a depth of 24 inches.

The BC and C horizons have hue of 10YR and value

and chroma of 4 to 6. The fine-earth texture is sandy loam, loam, or loamy sand and may be stratified.

Guyandotte Series

The Guyandotte series consists of very deep, well drained soils that formed in colluvium from sandstone, siltstone, and shale. Permeability is moderate. These soils are on head slopes, benches, and upper side slopes with dominantly cool aspects on Black Mountain. Slopes are concave and range from 35 to 80 percent. Guyandotte soils are loamy-skeletal, mixed, mesic Typic Haplumbrepts.

Guyandotte soils are associated on the landscape with Cloverlick, Fairpoint, Fiveblock, Highsplint, and Kaymine soils. Cloverlick and Highsplint soils have an ochric epipedon. Fairpoint, Fiveblock, and Kaymine soils formed in nonacid regolith in areas surface mined for coal.

Typical pedon of Guyandotte very channery loam in an area of Cloverlick-Guyandotte-Highsplint complex, 35 to 75 percent slopes, very stony; on a wooded side slope, 3,450 feet south of the confluence of the Left and Right Forks of Cloverlick Creek, about 5 miles southeast of Cumberland, in Harlan County; USGS Benham quadrangle; lat. 37 degrees 54 minutes 54 seconds N. and long. 82 degrees 56 minutes 51 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed leaf litter; abrupt wavy boundary.

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) very channery loam, grayish brown (10YR 5/2) dry; moderate very fine granular structure; very friable; many very fine roots; 50 percent sandstone channers; strongly acid; gradual wavy boundary.

A2—7 to 17 inches; dark brown (10YR 3/3) very channery loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; friable; many fine roots; 50 percent sandstone channers; very strongly acid; clear wavy boundary.

Bw1—17 to 40 inches; dark yellowish brown (10YR 4/4) very channery loam; moderate fine subangular blocky structure; friable; common fine roots; 50 percent sandstone channers; strongly acid; diffuse wavy boundary.

Bw2—40 to 61 inches; yellowish brown (10YR 5/4) very channery loam; moderate very fine subangular blocky structure; friable; few fine roots; 60 percent sandstone channers; very strongly acid.

Solum thickness ranges from 50 to 70 inches or more. Depth to bedrock is more than 72 inches. Rock fragments, mostly channers and flagstones, make up 35 to 70 percent of the solum. Reaction is extremely acid to slightly acid in the A horizon and very strongly acid to moderately acid in the B horizon and in the C horizon, if it occurs.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The fine-earth texture is loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is silt loam or loam. Some pedons have faint discontinuous silt coatings on rock fragments and surfaces of peds in the lower part of the Bw horizon.

Some pedons have a C horizon. This horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is sandy loam or loam.

Handshoe Series

The Handshoe series consists of very deep, well drained soils that formed in colluvium weathered dominantly from sandstone. Permeability is moderately rapid. Handshoe soils are in coves, on linear side slopes, on head slopes of drainageways, on nose slopes, and on convex footslopes with dominantly warm aspects. Slopes are complex and range from 30 to 80 percent. Handshoe soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Handshoe soils are associated on the landscape with Fairpoint, Fedscreek, Fiveblock, Kaymine, Marrowbone, and Shelocta soils. Fedscreek and Marrowbone soils are coarse-loamy. Shelocta soils are fine-loamy. Fairpoint, Fiveblock, and Kaymine soils formed in nonacid regolith in areas surface mined for coal.

Typical pedon of Handshoe very channery loam in an area of Fedscreek-Shelocta-Handshoe complex, 30 to 80 percent slopes, very stony; on a wooded side slope in Thornsberry Branch, 50 feet north of a gas well in a road cut, 0.8 mile southwest of the confluence of Thornsberry Branch and Caney Creek, 2 miles north of Pippa Passes, in Knott County; USGS Wayland quadrangle; lat. 37 degrees 23 minutes 30 seconds N. and long. 82 degrees 50 minutes 49 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 7 inches; dark grayish brown (10YR 4/2) very channery loam; weak fine granular structure; very friable; many coarse, medium, and fine roots; 45 percent sandstone channers; strongly acid; clear smooth boundary.

E—7 to 14 inches; yellowish brown (10YR 5/4) very channery loam; moderate medium subangular blocky structure; friable; common fine and medium

roots; few fine tubular pores; 35 percent sandstone channers; slightly acid; clear wavy boundary.

Bw1—14 to 32 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine subangular blocky structure; friable; few fine roots; 40 percent sandstone channers and 20 percent sandstone flagstones; slightly acid; gradual wavy boundary.

Bw2—32 to 48 inches; yellowish brown (10YR 5/6) very channery loam; moderate fine subangular blocky structure; firm; few fine roots; 45 percent sandstone channers; strongly acid; clear wavy boundary.

Bw3—48 to 59 inches; yellowish brown (10YR 5/6) channery sandy loam; moderate medium subangular blocky structure; firm; very few very fine roots; 20 percent sandstone channers; strongly acid; clear smooth boundary.

BC—59 to 66 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak medium subangular blocky structure; firm; very few very fine roots; 45 percent sandstone channers; strongly acid.

CB—66 to 80 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak coarse subangular blocky structure; firm; very few very fine roots; 55 percent sandstone channers; very strongly acid.

Solum thickness ranges from 25 to 70 inches or more. Depth to bedrock is greater than 60 inches. The content of rock fragments of angular sandstone, dominantly less than 10 inches in size, ranges from 5 to 70 percent in the A and B horizons and from 35 to 80 percent in the CB and C horizons. Reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 1 to 4. The fine-earth texture is loam.

The E horizon and the BA or BE horizons, if they occur, have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 6. The fine-earth texture is loam, sandy loam, fine sandy loam, or loamy sand.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 3 to 8. It has more than 40 percent sand and less than 18 percent clay in the fine-earth fraction. The fine-earth texture is loam, sandy loam, or fine sandy loam or, rarely, silt loam.

The BC and CB horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. The fine-earth texture is loam, sandy loam, fine sandy loam, or loamy sand.

The C horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 8. The texture and thickness of the fine-earth fraction are similar to the BC and CB horizons. Some pedons have lithochromic mottles and/or redoximorphic features below a depth of 40 inches.

Helechawa Series

The Helechawa series consists of deep and very deep, somewhat excessively drained soils that formed in colluvium weathered from sandstone. Permeability is moderately rapid. Helechawa soils are in deeply incised ravines on the southeast-facing side of Pine Mountain. Slopes are complex and range from 35 to 75 percent. Helechawa soils are coarse-loamy, siliceous, mesic Typic Dystrochrepts.

Helechawa soils are associated on the landscape with Alticrest, Jefferson, Ramsey, Varilla, and Wallen soils. Varilla and Wallen soils are loamy-skeletal. Jefferson soils are fine-loamy. Ramsey soils are shallow. Alticrest soils are moderately deep.

Typical pedon of Helechawa fine sandy loam in an area of Helechawa-Varilla-Jefferson complex, 35 to 75 percent slopes, very stony; on a southeast-facing wooded head slope at an elevation of 2,040 feet on Pine Mountain, 3,000 feet (airline) southwest of Calloway Gap, 4,200 feet (airline) northwest of the confluence of Meetinghouse Branch and the Cumberland River, about 0.75 mile northeast of Calloway, in Bell County; USGS Balkan quadrangle; lat. 36 degrees 47 minutes 39 seconds N. and long. 83 degrees 33 minutes 46 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) fine sandy loam; moderate fine granular structure; very friable; many fine roots; 5 percent sandstone gravel; very strongly acid; abrupt wavy boundary.

BA—2 to 6 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine and medium subangular blocky structure; very friable; common fine roots; 5 percent sandstone gravel; very strongly acid; clear wavy boundary.

Bw1—6 to 16 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable; common fine roots; 5 percent sandstone gravel; very strongly acid; gradual wavy boundary.

Bw2—16 to 35 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable; common medium roots; 10 percent sandstone gravel; extremely acid; clear wavy boundary.

Bw3—35 to 49 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak medium subangular

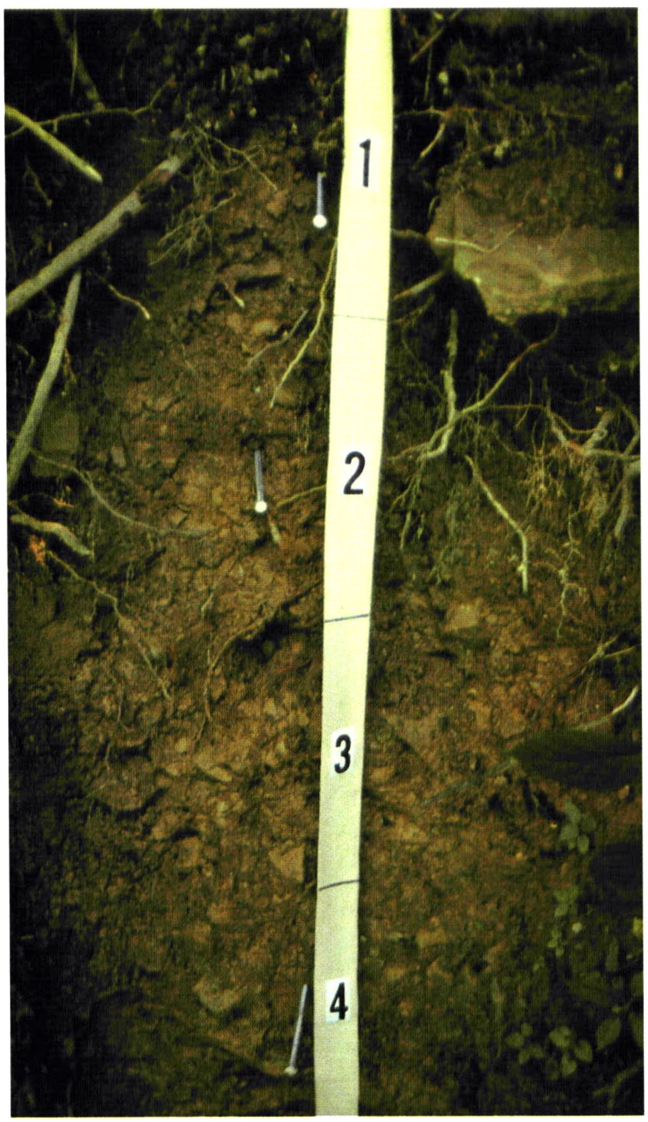

Figure 23.—Typical pedon of Cloverlick channery loam. The white nail heads mark the boundaries of horizons in the profile. Depth is marked in feet.

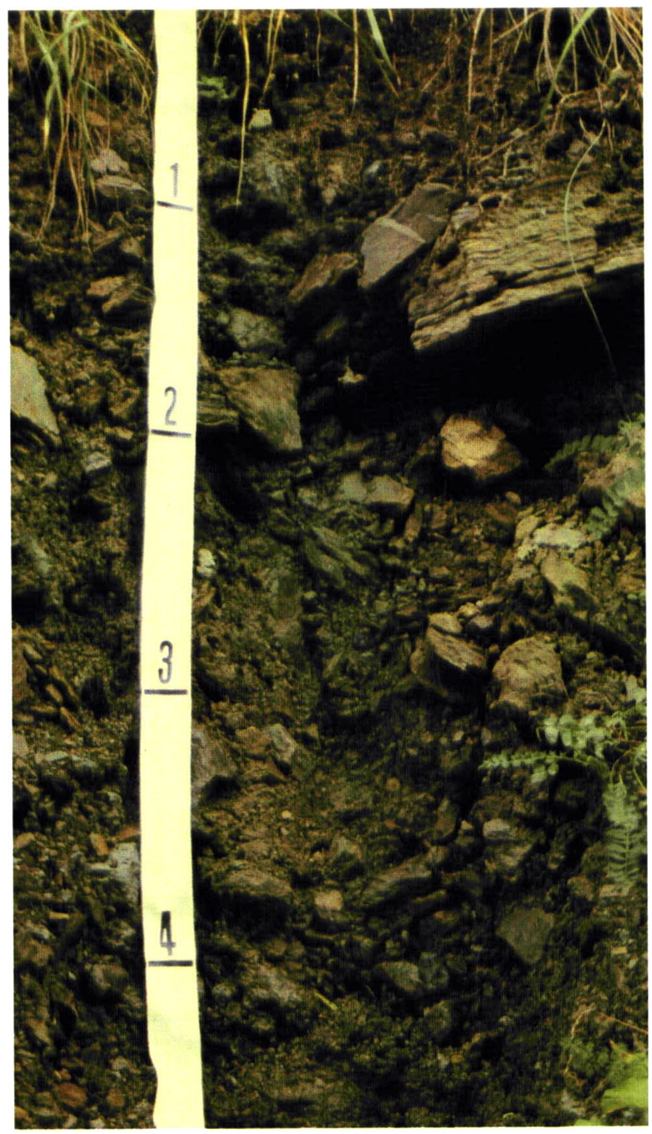

Figure 24.—Typical pedon of Kaymine channery silt loam. This soil has a high content of rock fragments. Depth is marked in feet.

Figure 25.—Typical pedon of Kimper silt loam. The umbric epipedon extends to a depth of 10 inches. Depth is marked in feet.

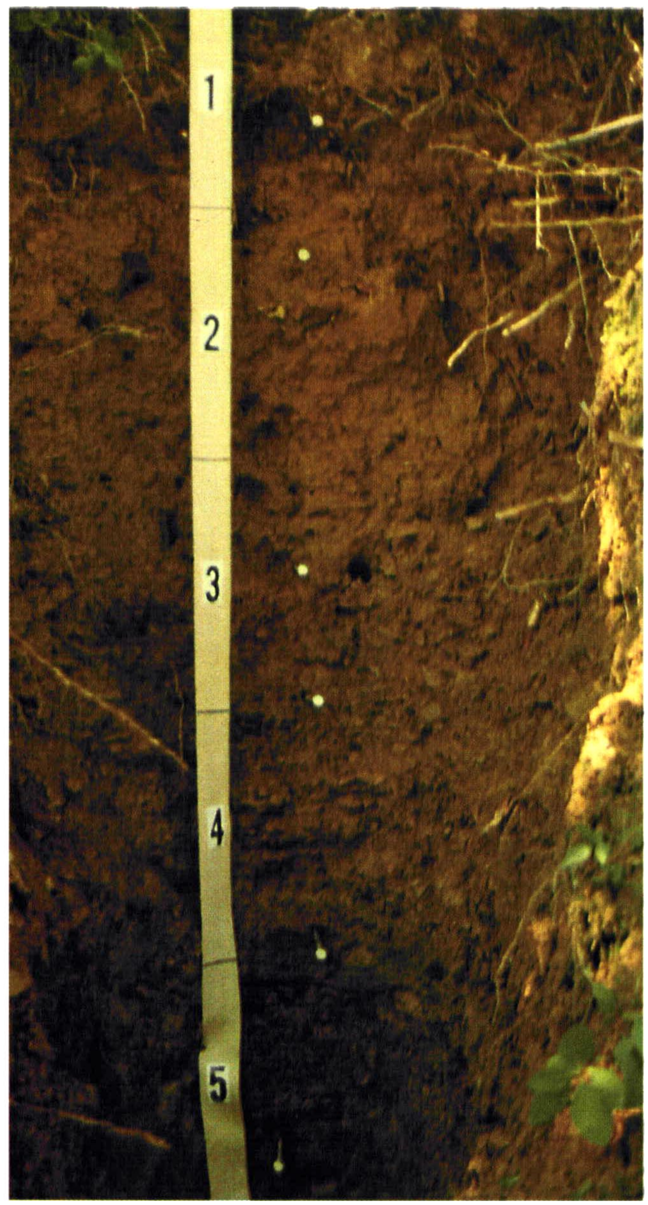

Figure 26.—Typical pedon of Shelocta silt loam. The white nail heads mark the boundaries between layers in the profile. Depth is marked in feet.

blocky structure; friable; few fine roots; 30 percent sandstone gravel; very strongly acid; abrupt irregular boundary.

R—49 inches; fractured sandstone bedrock.

Solum thickness ranges from 30 to more than 60 inches. Depth to bedrock ranges from 40 to more than 60 inches. The content of rock fragments, mainly sandstone or quartzite gravel, ranges from 0 to 35 percent. Reaction is strongly acid to extremely acid. In some pedons, however, the A horizon is moderately acid or slightly acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. The fine-earth texture is fine sandy loam.

The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is sandy loam, fine sandy loam, or loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. The fine-earth texture is sandy loam, fine sandy loam, or loam.

The BC horizon, if it occurs, has colors and fine-earth textures similar to the Bw horizon.

The C horizon, if it occurs, has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6. The fine-earth texture is sand, loamy sand, or sandy loam.

Highsplint Series

The Highsplint series consists of very deep, well drained soils that formed in loamy colluvium weathered dominantly from sandstone, siltstone, and shale. Permeability is moderate or moderately rapid. These soils are on upper side slopes, head slopes, benches, and footslopes with both warm and cool aspects in the southern and western parts of the survey area. Slopes are complex and range from 30 to 80 percent. Highsplint soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Highsplint soils are associated on the landscape with Cloverlick, Fairpoint, Fiveblock, Guyandotte, Kaymine, Kimper, Muse, and Shelocta soils. Kimper and Shelocta soils are fine-loamy. Muse soils are clayey. Cloverlick and Guyandotte soils have thicker and darker epipedons. Fairpoint, Fiveblock, and Kaymine soils formed in nonacid regolith in areas surface mined for coal.

Typical pedon of Highsplint channery silt loam in an area of Cloverlick-Kimper-Highsplint complex, 30 to 65 percent slopes, very stony; on a wooded footslope along Big Branch of Irishman Creek, 90 feet east of the first switch-back along an unimproved road, 1,400 feet southeast of Madden Cemetery, 5.3 miles south of Hindman, in Knott County; USGS Hindman quadrangle; lat. 37 degrees 15 minutes 31 seconds N. and long. 82 degrees 59 minutes 05 seconds W.

A—0 to 9 inches; brown (10YR 4/3) channery silt loam; weak fine subangular blocky structure parting to weak medium granular; friable; many fine and medium roots; few fine and medium tubular pores; 20 percent sandstone channers; slightly acid; clear wavy boundary.

Bw1—9 to 20 inches; dark yellowish brown (10YR 4/4) channery silt loam; weak fine granular structure; friable; common fine, medium, and coarse roots; 25 percent sandstone channers; moderately acid; clear smooth boundary.

Bw2—20 to 45 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; firm; few fine and medium roots; 45 percent sandstone channers; moderately acid; gradual smooth boundary.

Bw3—45 to 55 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; firm; few fine roots; 35 percent sandstone channers; moderately acid; clear smooth boundary.

BC—55 to 63 inches; dark yellowish brown (10YR 4/6) very channery silt loam; moderate fine and medium subangular blocky structure; firm; few fine roots; 35 percent sandstone channers and 10 percent siltstone parachanners; moderately acid; clear smooth boundary.

CB—63 to 80 inches; yellowish brown (10YR 5/6) very channery silt loam; weak coarse subangular blocky structure; firm; few fine roots; 45 percent siltstone channers and 10 percent siltstone parachanners; strongly acid.

Solum thickness ranges from 40 to more than 60 inches. Depth to bedrock is greater than 60 inches. Rock fragments are dominantly channers and flagstones. Most pedons have an A, BA, or Bw horizon to a depth of about 24 inches that contains 15 to 35 percent rock fragments. Below a depth of 24 inches, rock fragments make up 35 to 90 percent the soil. On Black Mountain, channers and flagstones make up 35 to 90 percent of horizons throughout the profile. Reaction ranges from extremely acid to slightly acid in the A horizon and from extremely acid to moderately acid in the Bw and C horizons.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The fine-earth texture is silt loam or loam.

The BA horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is silt loam or loam.

The Bw horizon has hue of 10YR and value and

chroma of 4 to 6. The fine-earth texture is silt loam, loam, or silty clay loam.

The BC and CB horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Some pedons have lithochromic mottles in shades of brown, olive, or gray below a depth of 24 inches. The fine-earth texture is silt loam, loam, or silty clay loam.

The C horizon, if it occurs, has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 6. Some pedons have redoximorphic features in shades of brown, olive, or gray below a depth of 40 inches. Some pedons have extremely firm or cemented horizons. The fine-earth texture is loam, silt loam, clay loam, or silty clay loam.

Holly Series

The Holly series consists of very deep, poorly drained soils that formed in mixed alluvium weathered from sandstone, siltstone, and shale. Permeability is moderate. These soils are in wet areas, seep spots, and depressions on flood plains in Letcher County. Slopes are slightly concave and range from 0 to 2 percent. Holly soils are fine-loamy, mixed, nonacid, mesic Typic Fluvaquents.

Holly soils are associated on the landscape with Allegheny, Grigsby, Itmann, and Rowdy soils and Udorthents. All of the associated soils are well drained. Allegheny soils have argillic horizons and are on terraces. Grigsby soils are coarse-loamy. Itmann soils formed in waste materials and by-products of coal mining. Udorthents are loamy-skeletal and consist of a mixture of soil and rock material that has been drastically disturbed.

Typical pedon of Holly loam, frequently flooded; in a narrow wooded drainageway in the Lily Cornett Woods, 1,500 feet southeast of the confluence of Island Branch and Line Fork, about 3 miles southwest of Roxanna, in Letcher County; USGS Roxanna quadrangle; lat. 37 degrees 04 minutes 55 seconds N. and long. 82 degrees 59 minutes 10 seconds W.

Oi—2 inches to 0; partially decomposed leaves, grass, roots, and twigs; abrupt wavy boundary.

A—0 to 3 inches; grayish brown (10YR 5/2) loam; weak fine granular structure; friable; few fine roots; common fine prominent strong brown (7.5YR 4/6) soft dendritic masses of iron accumulation with sharp boundaries lining root channels and pores; slightly acid; clear smooth boundary.

BA—3 to 8 inches; gray (10YR 6/1) loam; weak fine subangular blocky structure; friable; few fine roots; many fine prominent yellowish brown (10YR 5/6) soft dendritic masses of iron accumulation with sharp boundaries lining pores; 1 percent sandstone pebbles; slightly acid; clear smooth boundary.

Bg1—8 to 15 inches; gray (10YR 6/1) loam; weak medium subangular blocky structure; friable; few fine and medium roots; common fine prominent brownish yellow (10YR 6/6) and yellowish brown (10YR 5/8) soft irregular masses of iron accumulation with diffuse boundaries in the matrix; 1 percent sandstone channers; slightly acid; clear smooth boundary.

Bg2—15 to 20 inches; gray (10YR 6/1) loam; weak medium prismatic structure; friable; few fine roots; common fine prominent brownish yellow (10YR 6/6) and yellowish brown (10YR 5/8) soft irregular masses of iron accumulation with diffuse boundaries in the matrix; 1 percent sandstone channers; moderately acid; clear smooth boundary.

Bg3—20 to 31 inches; gray (10YR 6/1) loam; weak coarse subangular blocky structure; friable; few fine roots; few fine prominent yellow (10YR 7/6) soft irregular masses of iron accumulation with diffuse boundaries in the matrix; moderately acid; clear smooth boundary.

Bg4—31 to 44 inches; gray (10YR 5/1) sandy loam; weak coarse subangular blocky structure; friable; very few very fine roots; few fine prominent yellow (10YR 7/6) and yellowish brown (10YR 5/8) soft irregular masses of iron accumulation and common fine distinct black (10YR 2/1) weakly cemented spherical manganese nodules in the matrix; neutral; clear smooth boundary.

Cg—44 to 72 inches; bluish gray (5B 6/1) loam; massive; firm; common medium prominent brownish yellow (10YR 6/8) soft irregular masses of iron accumulation with diffuse boundaries in the matrix; neutral.

Solum thickness ranges from 20 to 44 inches. Thickness of loamy deposits over other alluvium ranges from 40 to 60 inches. The content of coarse fragments ranges from 0 to 10 percent in the A horizon, from 0 to 15 percent in the B horizon, and from 0 to 25 percent in the C horizon. Reaction ranges from moderately acid to neutral.

The A and BA horizons have hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The fine-earth texture is loam. Masses of iron accumulation in shades of yellow or brown commonly line root channels and pores.

The Bg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or less. Masses of iron accumulation, in shades of yellow or brown, and black

manganese nodules are common in the matrix. The fine-earth texture is silt loam or loam or, less commonly, sandy loam.

The Cg horizon has hue of 10YR to 5B or is neutral in hue with chroma of 2 or less. Masses of iron accumulation in shades of yellow or brown and black manganese nodules are common in the matrix. The fine-earth texture is loam, silt loam, or sandy loam. In places, the substratum contains thin strata of loamy sand, sand, clay loam, or silty clay loam below a depth of about 40 inches.

Itmann Series

The Itmann series consists of very deep, somewhat excessively drained soils that formed in acid regolith derived from waste materials and by-products of coal mining. Permeability is moderately rapid or rapid. These soils are a mixture of partially weathered fine earth, fragments of bedrock, and broken or crushed pieces of coal. They are on hillsides and valley floors throughout the survey area. Slopes are linear or convex in gently sloping to moderately steep areas and complex in steep or very steep areas. They range from 4 to 80 percent. Itmann soils are loamy-skeletal, mixed, acid, mesic Typic Udorthents.

Itmann soils are associated on the landscape with Grigsby, Holly, and Rowdy soils and Udorthents. Grigsby soils are coarse-loamy. Holly and Rowdy soils are fine-loamy. Udorthents are loamy-skeletal and consist of a mixture of soil and rock material that has been drastically disturbed.

Typical pedon of Itmann very channery sandy loam, 4 to 80 percent slopes; in an abandoned coal stockpile and washing facility 200 feet north of the confluence of Loves Branch and Rockhouse Creek, 2.2 miles (airline) west of Deane, in Letcher County; USGS Mayking quadrangle; lat. 37 degrees 14 minutes 0 seconds N. and long. 82 degrees 48 minutes 50 seconds W.

A—0 to 5 inches; very dark gray (N 3/0) very channery sandy loam; weak fine and medium granular structure; very friable; 50 percent channers (60 percent dark high-carbon siltstone, 10 percent sandstone, 10 percent shale, and 20 percent carboliths); extremely acid; clear smooth boundary.

C1—5 to 22 inches; very dark gray (N 3/0) very channery loam; weak medium and coarse subangular blocky structure; very friable; 40 percent channers (60 percent dark high-carbon siltstone, 10 percent sandstone, 15 percent shale, and 15 percent carboliths); extremely acid; abrupt smooth boundary.

C2—22 to 31 inches; very dark gray (N 3/0) extremely channery sandy loam; single grain; loose; 70 percent channers (60 percent dark high-carbon siltstone, 15 percent sandstone, 10 percent shale, and 15 percent carboliths); very strongly acid; clear smooth boundary.

C3—31 to 72 inches; very dark gray (N 3/0) very channery fine sandy loam; massive; friable; 40 percent channers (50 percent dark high-carbon siltstone, 10 percent sandstone, 30 percent shale, and 10 percent carboliths); strongly acid.

Depth to bedrock is more than 5 feet. Reaction ranges from extremely acid to strongly acid, unless the soil has been limed. The content of channers of carbolith, siltstone, sandstone, and shale ranges from 35 to 80 percent. Carbolith fragments constitute more than 50 percent of the total rock fragments. The fine-earth texture of the control section averages 4 to 15 percent clay. Soil colors are neutral in hue or have hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The fine-earth texture of the A horizon is sandy loam or loam. The A horizon of some pedons was formed by stockpiling natural surficial soil then spreading it over the land surface. In these pedons, the A horizon is 6 to 20 inches thick and contains 10 to 15 percent channers.

The fine-earth texture of the C horizon is sandy loam or loam. Thin layers or pockets of loamy sand are included.

Jefferson Series

The Jefferson series consists of very deep, well drained soils that formed in colluvium weathered from acid sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are in deeply incised ravines on the southeast-facing side of Pine Mountain in southern Letcher County. Slopes range from 20 to 60 percent. Jefferson soils are fine-loamy, siliceous, mesic Typic Hapludults.

Jefferson soils are associated on the landscape with Alticrest, Helechawa, Ramsey, Varilla, and Wallen soils. Alticrest and Helechawa soils are coarse-loamy. Varilla and Wallen soils are loamy-skeletal. Ramsey soils are shallow. None of these associated soils has an argillic horizon.

Typical pedon of Jefferson loam in an area of Varilla-Jefferson-Alticrest complex, 35 to 75 percent slopes, very rocky; on a wooded north-facing side slope in Little Joe Day Branch, 500 feet south of Scuttlehole Gap Road, about 4 miles south of Whitesburg, in Letcher County; USGS Whitesburg quadrangle; lat. 37

degrees 02 minutes 58 seconds N. and long. 82 degrees 51 minutes 24 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) loam; moderate very fine granular structure; very friable; many fine roots; 10 percent siltstone channers; strongly acid; abrupt smooth boundary.

AB—1 to 4 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; very friable; common fine roots; 10 percent siltstone channers; strongly acid; clear smooth boundary.

E—4 to 13 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; very friable; many fine, medium, and coarse roots; few fine tubular pores; 5 percent sandstone channers; strongly acid; clear smooth boundary.

Bt1—13 to 19 inches; yellowish brown (10YR 5/8) channery loam; weak fine subangular blocky structure; friable; common fine and medium roots; few fine tubular pores; few distinct dark yellowish brown (10YR 4/6) clay films on faces of peds; 30 percent sandstone channers; very strongly acid; clear smooth boundary.

Bt2—19 to 33 inches; strong brown (7.5YR 5/8) channery loam; moderate medium angular blocky structure; friable; few fine and medium roots; few distinct reddish yellow (7.5YR 6/6) clay films on faces of peds; 20 percent sandstone channers; very strongly acid; clear smooth boundary.

Bt3—33 to 48 inches; reddish yellow (7.5YR 6/8) channery loam; moderate medium angular blocky structure; firm; very few fine and medium roots; few distinct reddish yellow (7.5YR 6/6) clay films on faces of peds; 30 percent sandstone channers; very strongly acid; clear smooth boundary.

BC—48 to 62 inches; yellowish brown (10YR 5/8) very channery loam; moderate coarse subangular blocky structure; firm; very few very fine roots; 45 percent sandstone channers; extremely acid; abrupt smooth boundary.

R—62 inches; fractured sandstone.

Solum thickness is more than 40 inches. Depth to bedrock is greater than 60 inches. The content of rock fragments, dominantly sandstone channers and gravel, ranges from 5 to 35 percent to a depth of about 40 inches and from 20 to 80 percent below a depth of 40 inches. Reaction is strongly acid or very strongly acid, except in the A horizon where reaction is neutral.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3. The fine-earth texture is loam.

The AB and E horizons have hue of 10YR, value of 4 to 6, and chroma of 3 or 4. The fine-earth texture is loam or sandy loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. The fine-earth texture is loam, sandy loam, sandy clay loam, or clay loam.

The BC horizon is in shades of brown, red, or gray and commonly has lithochromic mottles. The fine-earth texture is loam, sandy loam, clay loam, or sandy clay loam.

The C horizon, if it occurs, has colors and fine-earth textures similar to the BC horizon. Some pedons have a 2C horizon below a depth of about 50 inches that is weathered shale.

The bedrock is mostly sandstone of varying hardness.

Kaymine Series

The Kaymine series consists of very deep, well drained soils that formed during the excavation of nonacid regolith during surface coal mining. Permeability is moderate or moderately rapid. These soils are a mixture of native soils and broken or crushed pieces of bedrock that were above the coal. They are on benches and hollow fills throughout the survey area. Slopes range from 0 to 70 percent. Kaymine soils are loamy-skeletal, mixed, nonacid, mesic Typic Udorthents.

Kaymine soils in this survey area are mapped as an undifferentiated unit with Fairpoint and Fiveblock soils, which also formed in nonacid regolith from surface coal mining. Fairpoint soils have moderately slow permeability and more clay in the control section than Kaymine soils. Fiveblock soils have rapid permeability and more sand in the control section than Kaymine soils. Kaymine soils are also associated on the landscape with Cloverlick, Dekalb, Fedscreek, Gilpin, Guyandotte, Handshoe, Highsplint, Kimper, Marrowbone, Rayne, and Shelocta soils. These associated soils did not form in regolith from surface mining. Fedscreek and Marrowbone soils are coarse-loamy. Kimper, Gilpin, Rayne, and Shelocta soils are fine-loamy. Dekalb soils are moderately deep. Cloverlick, Guyandotte, Handshoe, and Highsplint soils have cambic horizons.

Typical pedon of Kaymine channery silt loam in an area of Kaymine, Fairpoint, and Fiveblock soils, benched, 2 to 70 percent slopes, very stony (fig. 24); in a drainageway 2,000 feet southwest (airline) of the Appalachian Regional Hospital, in Letcher County; USGS Whitesburg quadrangle; lat. 37 degrees 06 minutes 33 seconds N. and long. 82 degrees 49 minutes 00 seconds W.

A—0 to 4 inches; grayish brown (10YR 5/2) channery silt loam; weak fine granular structure; friable; common fine roots; 30 percent channers (60 percent siltstone and 40 percent sandstone); slightly alkaline; clear wavy boundary.

AC—4 to 14 inches; brown (10YR 4/3) very channery silt loam; weak fine subangular blocky structure; firm; few fine roots; 40 percent channers (60 percent siltstone, 30 percent shale, and 10 percent sandstone); slightly alkaline; clear smooth boundary.

C1—14 to 24 inches; brown (10YR 4/3) very flaggy silt loam; many medium prominent brownish yellow (10YR 6/8) lithochromic mottles; massive; firm; very few very fine roots; 40 percent flagstones and 20 percent channers (60 percent siltstone, 30 percent shale, and 10 percent sandstone); slightly alkaline; clear wavy boundary.

C2—24 to 45 inches; dark gray (10YR 4/1) very channery silt loam; massive; firm; 50 percent channers (60 percent siltstone, 20 percent shale, and 20 percent sandstone); slightly alkaline; gradual smooth boundary.

C3—45 to 80 inches; brown (10YR 4/3) very channery silt loam; massive; firm; 60 percent channers (60 percent siltstone, 25 percent shale, and 15 percent sandstone); slightly alkaline.

Depth to bedrock is more than 5 feet. The content of rock fragments, dominantly channers and flagstones, ranges from 15 to 80 percent but averages 35 percent or more in the particle-size control section. Reaction ranges from moderately acid to slightly alkaline.

The A and AC horizons have hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 0 to 4. The fine-earth texture is silt loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 2 to 6, and chroma of 1 to 8. The fine-earth texture is loam or silt loam.

Kimper Series

The Kimper series consists of deep and very deep, well drained soils that formed in mixed colluvium weathered from sandstone, siltstone, and shale. Permeability is moderate. Kimper soils are on linear side slopes, head slopes of coves, and narrow benches throughout most of the survey area and on upper side slopes, shoulder slopes, and head slopes of drainageways on the ridgetop of Black Mountain. Slopes are complex and range from 20 to 80 percent. Kimper soils are fine-loamy, mixed, mesic Umbric Dystrochrepts.

Kimper soils are associated on the landscape with Cloverlick, Fairpoint, Fiveblock, Gilpin, Highsplint, Kaymine, Renox, Shelocta, and Summers soils. Cloverlick, Highsplint, and Summers soils are loamy-skeletal. Gilpin, Renox, and Shelocta soils have argillic horizons. Fairpoint, Fiveblock, and Kaymine soils formed in nonacid regolith from surface mining.

Typical pedon of Kimper silt loam in an area of Cloverlick-Shelocta-Kimper complex, 20 to 70 percent slopes, stony (fig. 25); on a wooded side slope in a road cut, 1,000 feet southeast of a barn at the confluence of the two main branches of Long Fork, 1 mile southeast of the confluence of Long Fork and Jones Fork, 2 miles north of the intersection of Kentucky Highways 1697 and 550 at Garner, in Knott County; USGS Hindman quadrangle; lat. 37 degrees 21 minutes 57 seconds N. and long. 82 degrees 53 minutes 25 seconds W.

Oi—4 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 6 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine and medium granular structure; very friable; many fine and medium roots; 10 percent sandstone channers; moderately acid; abrupt wavy boundary.

BA—6 to 10 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; many fine and medium roots; few fine tubular pores; 10 percent sandstone channers; moderately acid; abrupt wavy boundary.

Bw1—10 to 29 inches; yellowish brown (10YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; few fine tubular pores; 10 percent sandstone channers; moderately acid; clear smooth boundary.

Bw2—29 to 46 inches; yellowish brown (10YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; friable; few fine and medium roots; 10 percent sandstone channers; moderately acid; clear smooth boundary.

Bw3—46 to 62 inches; yellowish brown (10YR 5/6) silt loam; weak medium and coarse subangular blocky structure; friable; few fine roots; 10 percent sandstone channers; moderately acid; clear smooth boundary.

CB—62 to 80 inches; brown (10YR 5/3) very channery loam; weak coarse subangular blocky structure; firm; few fine and medium roots; 50 percent sandstone channers; slightly acid.

Solum thickness and depth to bedrock range from 40 to more than 60 inches. The content of rock fragments ranges from 5 to 60 percent in individual horizons but is less than 35 percent in the control

section. Reaction ranges from strongly acid to neutral in the A horizon and from very strongly acid to moderately acid in the Bw and CB horizons.

The A and BA horizons have hue of 7.5YR to 2.5Y, value of 2 to 4, and chroma of 1 to 4; however, to a depth of 7 inches, after mixing, they have value and chroma of less than 4 (moist) or less than 6 (dry). The fine-earth texture is silt loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is silt loam, fine sandy loam, sandy loam, or loam. Some pedons have redoximorphic features in shades of brown, yellow, black, red, or gray below a depth of about 40 inches.

The CB horizon has fine-earth textures and colors similar to the Bw horizon. Some pedons have lithochromic mottles in shades of brown, yellow, red, or gray below a depth of about 60 inches.

Marrowbone Series

The Marrowbone series consists of moderately deep, well drained soils that formed in residuum weathered dominantly from acid sandstone. Permeability is moderately rapid. These soils are on ridgetops in northern and eastern Knott County and in eastern Letcher County and on upper side slopes in northern Knott County. Slopes are convex and range from 20 to 80 percent. Marrowbone soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Marrowbone soils are associated on the landscape with Dekalb, Fairpoint, Fedscreek, Fiveblock, Gilpin, Handshoe, and Kaymine soils. Dekalb and Handshoe soils are loamy-skeletal. Gilpin soils are fine-loamy. Fedscreek soils are very deep. Fairpoint, Fiveblock, and Kaymine soils formed in nonacid regolith from surface mining.

Typical pedon of Marrowbone fine sandy loam in an area of Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very rocky; on a ridgetop 200 feet southeast of a communications tower, 1 mile north of Pippa Passes, in Knott County; USGS Hindman quadrangle; lat. 37 degrees 21 minutes 31 seconds N. and long. 82 degrees 52 minutes 59 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; many fine roots; 5 percent sandstone channers; extremely acid; abrupt smooth boundary.

Bw1—2 to 8 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable; many fine and few coarse roots; 8 percent sandstone channers; very strongly acid; clear wavy boundary.

Bw2—8 to 18 inches; brownish yellow (10YR 6/6) fine sandy loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; 8 percent sandstone channers; strongly acid; gradual smooth boundary.

Bw3—18 to 31 inches; brownish yellow (10YR 6/6) sandy loam; moderate medium subangular blocky structure; firm; few fine and medium roots; 8 percent sandstone channers; very strongly acid; clear smooth boundary.

C—31 to 37 inches; brownish yellow (10YR 6/6) sandy loam; massive; firm; 10 percent sandstone channers; very strongly acid; abrupt smooth boundary.

R—37 inches; sandstone bedrock.

Solum thickness and depth to bedrock range from 20 to 40 inches. The content of rock fragments ranges from 5 to 45 percent in individual horizons but averages less than 35 percent in the particle-size control section. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. The fine-earth texture is fine sandy loam.

The Bw and C horizons have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. The fine-earth texture is sandy loam, fine sandy loam, loam, or silt loam.

The bedrock is unweathered sandstone or siltstone.

Muse Series

The Muse series consists of deep, well drained soils that formed in colluvium weathered from siltstone and shale. Permeability is slow. These soils are on lower convex nose slopes and benches and in deeply incised ravines on the northwest-facing side of Pine Mountain in southern Letcher County. Slopes are linear or slightly concave and range from 30 to 80 percent. Muse soils are clayey, mixed, mesic Typic Hapludults.

Muse soils are associated on the landscape with Highsplint and Shelocta soils. Highsplint soils are loamy-skeletal. Shelocta soils are fine-loamy.

Typical pedon of Muse silt loam in an area of Highsplint-Shelocta-Muse complex, 30 to 80 percent slopes, extremely stony; on a wooded bench on the scarp face of Pine Mountain, 1,000 feet southwest of a cemetery on a narrow nose slope between Bartesta Branch and Slipfield Branch, about 3 miles south of Whitesburg, in Letcher County; USGS Whitesburg

quadrangle; lat. 37 degrees 04 minutes 17 seconds N. and long. 82 degrees 50 minutes 04 seconds W.

Oi—4 inches to 0; undecomposed and partially decomposed hardwood leaf litter and twigs; abrupt wavy boundary.

A—0 to 5 inches; very dark gray (10YR 3/1) silt loam; weak fine and medium granular structure; friable; common fine and medium roots; 2 percent siltstone channers; neutral; clear smooth boundary.

Bt1—5 to 10 inches; brown (10YR 5/3) silty clay loam; moderate medium subangular blocky structure; firm; few fine, medium, and coarse roots; few faint clay films on faces of peds; 5 percent siltstone channers; strongly acid; clear wavy boundary.

Bt2—10 to 22 inches; brown (10YR 5/3) channery silty clay loam; strong medium subangular blocky structure; firm; few fine roots; many faint clay films on faces of peds; 30 percent shale channers; very strongly acid; clear smooth boundary.

Bt3—22 to 32 inches; brown (10YR 5/3) channery silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; many faint clay films on faces of peds; 20 percent shale channers; very strongly acid; clear smooth boundary.

Bt4—32 to 40 inches; yellowish brown (10YR 5/6) silty clay loam; few fine distinct strong brown (7.5YR 5/8) lithochromic mottles; moderate medium and coarse subangular blocky structure; firm; few fine roots; many faint clay films on faces of peds; 10 percent shale channers; strongly acid; clear wavy boundary.

CB—40 to 48 inches; yellowish brown (10YR 5/6) very channery silty clay loam; weak fine subangular blocky structure; firm; few fine roots; 50 percent siltstone and shale channers; strongly acid; abrupt smooth boundary.

C—48 to 53 inches; yellowish brown (10YR 5/6) very channery silty clay loam; massive; firm; 50 percent shale channers; strongly acid; gradual wavy boundary.

Cr—53 to 63 inches; weathered shale.

Solum thickness and depth to bedrock range from 40 to 60 inches. The content of rock fragments, dominantly siltstone and shale channers, ranges from 0 to 35 percent in the upper part of the solum and from 0 to 60 percent in the CB and C horizons. Reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. The fine-earth texture is silt loam or silty clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 8. The fine-earth texture is silty clay loam or silty clay. Some pedons have soft masses of iron accumulation in shades of red or brown below a depth of 24 inches.

The BC horizon has colors and fine-earth textures similar to the Bt horizon.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 1 to 6. The fine-earth texture is silty clay loam, silty clay, or clay. Some pedons have lithochromic mottles in shades of red, brown, or gray below a depth of 40 inches.

The Cr horizon is soft, weathered, fissile shale or siltstone.

Ramsey Series

The Ramsey series consists of shallow, somewhat excessively drained soils that formed in residuum weathered from acid sandstone. Permeability is rapid. These soils are on narrow ridges on the southeast-facing side of Pine Mountain in southern Letcher County. Slopes are irregular and broken by tilted sandstone rock outcrops. They range from 20 to 55 percent. Ramsey soils are loamy, siliceous, mesic Lithic Dystrochrepts.

Ramsey soils are associated on the landscape with Alticrest, Helechawa, Jefferson, Varilla, and Wallen soils. Alticrest and Helechawa soils are coarse-loamy. Jefferson soils are fine-loamy. Varilla and Wallen soils are loamy-skeletal.

Typical pedon of Ramsey sandy loam in an area of Alticrest-Ramsey-Wallen complex, 20 to 55 percent slopes, rocky; 100 feet north of the Little Shepherd Trail on the dip face of Pine Mountain, 2 miles south of Whitesburg, in Letcher County; USGS Whitesburg quadrangle; lat. 37 degrees 04 minutes 18 seconds N. and long. 82 degrees 48 minutes 55 seconds W.

Oi—2 inches 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 1 inch; dark brown (10YR 3/3) sandy loam; weak fine granular structure; very friable; many fine and medium roots; 5 percent sandstone channers; very strongly acid; abrupt smooth boundary.

Bw1—1 to 8 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine and medium and few coarse roots; 5 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw2—8 to 14 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; common fine and medium roots; 10 percent sandstone channers; very strongly acid; clear smooth boundary.

BC—14 to 17 inches; yellowish brown (10YR 5/8) channery sandy loam; weak medium subangular blocky structure; friable; common fine roots; 25 percent sandstone channers; very strongly acid; abrupt smooth boundary.
R—17 inches; fractured sandstone.

Solum thickness and depth to bedrock range from 7 to 20 inches. The content of coarse fragments of sandstone or quartzite ranges from 0 to 15 percent in the surface layer and from 5 to 35 percent in the subsoil. Fragments are dominantly less than 3 inches in diameter in the upper part of the solum but range to as much as 10 inches in diameter in the lower part. Reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 4. The fine-earth texture is sandy loam.

The Bw and BC horizons have hue of 10YR, value of 4 to 6, and chroma of 3 to 8. The fine-earth texture is sandy loam, fine sandy loam, or loam.

Rayne Series

The Rayne series consists of deep, well drained soils that formed in residuum weathered from interbedded, acid, soft sandstone and siltstone. Permeability is moderate. These soils are on broad saddles and a few narrow benches on ridgetops in southern Knott County and western Letcher County. Slopes are linear or convex and range from 25 to 65 percent. Rayne soils are fine-loamy, mixed, mesic Typic Hapludults.

Rayne soils are associated on the landscape with Dekalb, Fairpoint, Fiveblock, Gilpin, and Kaymine soils. Dekalb soils are loamy-skeletal. Gilpin soils are moderately deep. Fairpoint, Fiveblock, and Kaymine soils formed in nonacid regolith from surface mining.

Typical pedon of Rayne silt loam in an area of Dekalb-Gilpin-Rayne complex, 25 to 65 percent slopes, very rocky; on a narrow, wooded ridgetop, 200 feet south of an unimproved road through Island Branch, 1 mile east of the visitor center at Lily Cornett Woods, 2 miles (airline) southwest of Roxanna, in Letcher County; USGS Roxanna quadrangle; lat. 37 degrees 5 minutes 10 seconds N. and long. 82 degrees 58 minutes 12 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.
A—0 to 2 inches; dark grayish brown (10YR 3/3) silt loam; weak fine granular structure; friable; many fine and medium roots; strongly acid; abrupt wavy boundary.
BA—2 to 8 inches; brownish yellow (10YR 6/6) silt loam; weak fine subangular blocky structure parting to weak fine granular; friable; many fine and medium roots; many prominent dark grayish brown (10YR 3/3) organic stains on all faces of peds; 10 percent sandstone channers; very strongly acid; clear smooth boundary.
Bt1—8 to 15 inches; brownish yellow (10YR 6/6) silty clay loam; weak fine subangular blocky structure; firm; few fine roots; common distinct very pale brown (10YR 7/4) clay films on faces of peds; 10 percent sandstone and siltstone channers; very strongly acid; clear smooth boundary.
Bt2—15 to 24 inches; brownish yellow (10YR 6/6) silty clay loam; few fine distinct pale brown (10YR 6/3) lithochromic mottles; moderate fine and medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many distinct very pale brown (10YR 7/4) clay films on faces of peds; 10 percent sandstone and siltstone channers; very strongly acid; clear smooth boundary.
BC—24 to 30 inches; strong brown (7.5YR 5/8) silty clay loam; few fine prominent pale brown (10YR 6/3) lithochromic mottles; moderate medium and coarse subangular blocky structure; firm; few fine roots; 10 percent sandstone and siltstone channers; very strongly acid; gradual smooth boundary.
CB—30 to 40 inches; variegated light gray (10YR 7/1), strong brown (7.5YR 5/8), and brownish yellow (10YR 6/6) channery silty clay loam; weak coarse subangular blocky structure; firm; 25 percent sandstone and siltstone channers; very strongly acid; abrupt smooth boundary.
Cr—40 to 46 inches; soft weathered siltstone.
R—46 inches; unweathered interbedded siltstone and sandstone bedrock.

Solum thickness and depth to bedrock range from 40 to 60 inches. The content of rock fragments ranges from 0 to 30 percent in the upper part of the solum and from 15 to 40 percent below a depth of about 30 inches. The average content of rock fragments in the particle-size control section is less than 35 percent. Reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. The fine-earth texture is silt loam.

The BA, Bt, and BC horizons have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. The fine-earth texture is silt loam, loam, or silty clay loam.

The C horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 1 to 8. The fine-earth texture is silt loam, loam, or silty clay loam.

The bedrock is interbedded siltstone and sandstone.

Renox Series

The Renox series consists of very deep, well drained soils that formed in mixed colluvium weathered from interbedded siltstone, shale, limestone, and sandstone. Permeability is moderate. These soils are on linear side slopes and benches on the northwest-facing side of Pine Mountain. Slopes are linear or slightly concave and range from 30 to 80 percent. Renox soils are fine-loamy, mixed, mesic Ultic Hapludalfs.

Renox soils are associated on the landscape with Bledsoe, Caneyville, Cloverlick, and Kimper soils. Cloverlick soils are loamy-skeletal. Bledsoe and Caneyville soils are clayey. Kimper soils do not have argillic horizons.

Typical pedon of Renox silt loam in an area of Kimper-Cloverlick-Renox complex, 30 to 80 percent slopes, extremely stony; on a wooded bench accessed by a foot path in Kingdom Come State Park, 1,000 feet northwest of Little Shepherd Trail, 500 feet east of a power transmission line, 3 miles east of Gordon, in Letcher County; USGS Benham quadrangle; lat. 36 degrees 59 minutes 58 seconds N. and long. 82 degrees 59 minutes 02 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 5 inches; dark yellowish brown (10YR 3/4) silt loam; weak fine granular structure; very friable; common fine roots; 10 percent sandstone channers; neutral; clear wavy boundary.

BA—5 to 13 inches; dark yellowish brown (10YR 4/4) channery silt loam; weak medium subangular blocky structure parting to weak fine granular; friable; common fine, medium, and coarse roots; 20 percent sandstone channers; slightly acid; clear smooth boundary.

Bt1—13 to 23 inches; strong brown (7.5YR 5/6) channery silt loam; weak fine and medium subangular blocky structure; friable; few fine roots; few faint clay films along root channels; 25 percent sandstone channers; moderately acid; clear smooth boundary.

Bt2—23 to 30 inches; strong brown (7.5YR 5/6) channery loam; weak medium subangular blocky structure; firm; few fine roots; few prominent light brown (10YR 6/3) clay films on surfaces of peds; 30 percent sandstone channers; moderately acid; clear smooth boundary.

2Bt3—30 to 44 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common prominent light brown (7.5YR 6/4) clay films on faces of peds; 5 percent sandstone channers; strongly acid; clear smooth boundary.

2Bt4—44 to 60 inches; yellowish brown (10YR 5/4) channery silty clay loam; weak coarse subangular blocky structure; firm; few fine roots; common prominent yellow (10YR 7/6) clay films on faces of peds; 20 percent sandstone and siltstone channers; slightly acid; gradual smooth boundary.

2C—60 to 80 inches; yellowish brown (10YR 5/4) channery silty clay loam; massive; firm; 20 percent sandstone and siltstone channers; slightly acid.

Solum thickness ranges from 48 to more than 60 inches. Depth to soft shale or siltstone is more than 60 inches. The content of rock fragments, dominantly sandstone channers, makes up a trace amount to about 30 percent in the solum and from a trace amount to 50 percent in the substratum. Reaction ranges from strongly acid to neutral.

The A horizon has a hue of 10YR, value of 3 or 4, and chroma of 2 to 4. The fine-earth texture is silt loam.

The BA and Bt horizons have hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is silt loam or loam.

The 2Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is silty clay loam or clay loam.

The 2C horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. Some pedons have redoximorphic features in shades of brown or gray below a depth of 40 inches. The fine-earth texture is silt loam, loam, or silty clay loam.

Rowdy Series

The Rowdy series consists of very deep, well drained soils that formed in loamy alluvium weathered from acid sandstone, shale, and siltstone. Permeability is moderate. These soils are on slightly convex low-lying stream terraces and smooth alluvial fans along rivers and major streams throughout the survey area. Slopes are linear or slightly convex and range from 0 to 4 percent. Rowdy soils are fine-loamy, mixed, mesic Fluventic Dystrochrepts.

Rowdy soils are associated on the landscape with Allegheny, Grigsby, Holly, and Itmann soils and Udorthents. Allegheny soils have argillic horizons. Holly soils are poorly drained. Grigsby soils are coarse-loamy. Itmann soils formed in waste materials and by-products of coal mining. Udorthents are loamy-skeletal and consist of a mixture of soil and rock material that has been drastically disturbed.

Typical pedon of Rowdy loam in an area of Rowdy-Grigsby complex, 0 to 4 percent slopes, occasionally

flooded; on the valley floor along Troublesome Creek on the campus of Camp Nathanael, 0.5 mile south of Emmalena, in Knott County; USGS Carrie quadrangle; lat. 37 degrees 19 minutes 58 seconds N. and long. 83 degrees 04 minutes 55 seconds W.

Ap—0 to 10 inches; brown (10YR 4/3) loam; moderate medium granular structure; very friable; many fine roots; moderately acid; clear smooth boundary.

BA—10 to 16 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; very few very fine roots; strongly acid; clear smooth boundary.

Bw1—16 to 27 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; very few very fine roots; strongly acid; clear smooth boundary.

Bw2—27 to 47 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable; few fine roots; strongly acid; gradual smooth boundary.

CB—47 to 65 inches; brownish yellow (10YR 6/6) loam; weak fine subangular blocky structure; friable; few fine roots; strongly acid; gradual smooth boundary.

C—65 to 80 inches; pale brown (10YR 6/3) clay loam; massive; firm; common fine prominent strong brown (7.5YR 5/8) soft irregular masses of iron accumulation with diffuse boundaries and common medium prominent light gray (10YR 7/2) irregular iron depletions with diffuse boundaries in the matrix; very strongly acid.

Solum thickness ranges from 40 to more than 60 inches. Depth to bedrock is more than 60 inches. The content of rock fragments, dominantly sandstone gravel and pebbles, ranges from 0 to 30 percent in the solum and up to 60 percent in the C horizon. In some pedons, as much as 15 percent of the rock fragments are shale and coal channers. Reaction ranges from very strongly acid to moderately acid, unless the soil has been limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The fine-earth texture is loam.

The BA horizon has colors similar to the Ap horizon. The fine-earth texture is loam, silt loam, or fine sandy loam.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. The fine-earth texture is loam, silt loam, or sandy clay loam.

The CB and C horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Most pedons have redoximorphic features below a depth of 40 inches. The fine-earth texture is loam, fine sandy loam, sandy loam, clay loam, or sandy clay loam. Some pedons are stratified.

Shelocta Series

The Shelocta series consists of deep, well drained soils that formed in mixed colluvium weathered from acid shale, siltstone, and sandstone. Permeability is moderate. These soils are in coves, on side slopes, on benches, and on footslopes of hillsides with dominantly warm aspects throughout the survey area. Slopes are complex and range from 12 to 80 percent. Shelocta soils are fine-loamy, mixed, mesic Typic Hapludults.

Shelocta soils are associated on the landscape with Cloverlick, Dekalb, Fairpoint, Fedscreek, Fiveblock, Gilpin, Handshoe, Highsplint, Kaymine, Kimper, and Muse soils. Cloverlick, Dekalb, Handshoe, and Highsplint soils are loamy-skeletal. Fedscreek soils are coarse-loamy. Gilpin soils are moderately deep. Muse soils are clayey. Fairpoint, Fiveblock, and Kaymine soils formed in nonacid regolith in areas surface mined for coal.

Typical pedon of Shelocta silt loam in an area of Shelocta-Highsplint complex, 30 to 65 percent slopes, very stony (fig. 26); in a road cut 20 feet north of unimproved Wiley Branch Road in the Left Fork of Troublesome Creek, 600 feet northwest of Kentucky Highway 550, about 1 mile northeast of Garner, in Knott County; USGS Hindman quadrangle; lat. 37 degrees 22 minutes 19 seconds N. and long. 82 degrees 54 minutes 52 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt smooth boundary.

A—0 to 3 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; 5 percent siltstone channers; strongly acid; clear smooth boundary.

BE—3 to 8 inches; yellowish brown (10YR 5/8) silt loam; weak fine granular and moderate medium subangular blocky structure; friable; common fine and medium roots; few medium tubular pores; 5 percent sandstone and siltstone channers; very strongly acid; clear smooth boundary.

Bt1—8 to 13 inches; strong brown (7.5YR 5/8) silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; few medium tubular pores; few faint clay films on surfaces of peds; 10 percent siltstone channers; very strongly acid; clear smooth boundary.

Bt2—13 to 27 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular and angular blocky structure; friable; common fine and medium and few coarse roots; many distinct yellowish red (5YR 5/6) clay films on surfaces of peds; 10 percent siltstone channers; very strongly acid; clear smooth boundary.

Bt3—27 to 35 inches; yellowish brown (10YR 5/6) very channery silt loam; moderate coarse subangular blocky structure; friable; few very fine roots; few distinct strong brown (7.5YR 5/6) clay films on surfaces of peds and on rock fragments; 40 percent sandstone channers; very strongly acid; clear smooth boundary.

BC—35 to 48 inches; yellowish brown (10YR 5/6) very channery silt loam; weak fine angular blocky structure; firm; few fine roots; 45 percent siltstone channers; strongly acid; clear smooth boundary.

C—48 to 56 inches; yellowish brown (10YR 5/6) very channery silt loam; common medium distinct strong brown (7.5YR 5/6) lithochromic mottles; massive; firm; 50 percent siltstone channers; strongly acid; clear smooth boundary.

Cr—56 to 66 inches; soft weathered siltstone.

Solum thickness and depth to bedrock range from 40 to 60 inches. The content of coarse fragments ranges from 2 to 35 percent in the A horizon, from 5 to 50 percent in the B horizon, and from 15 to 70 percent in the C horizon. Reaction is very strongly acid or strongly acid. Some pedons have A horizons that are moderately acid or slightly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 3. Cultivated areas have Ap horizons that have hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The fine-earth texture is silt loam.

The BE horizon has hue of 7.5YR to 2.5Y and value and chroma of 4 to 6. The fine-earth texture is loam or silt loam. Some pedons have E or BA horizons with similar colors and textures.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The fine-earth texture is loam, silt loam, or silty clay loam. Loam textures occur in some pedons, but they are not throughout the Bt horizon. Lithochromic mottles in shades of brown or gray are common in the lower part of the horizon.

The BC and C horizons have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6. The fine-earth texture is loam, silt loam, or silty clay loam. Lithochromic mottles in shades of brown, olive, or gray are common throughout the horizon.

Some pedons have 2B or 2C horizons below a depth of 40 inches. These horizons weathered from shale or siltstone. Textures are silty clay or clay.

Summers Series

The Summers series consists of moderately deep, well drained soils that formed in residuum weathered from sandstone and siltstone. Permeability is moderately rapid. These soils are on ridgetops on Black Mountain. Permeability is moderately rapid. Slopes range from 20 to 55 percent. Summers soils are loamy-skeletal, mixed, mesic Typic Haplumbrepts.

Summers soils are associated on the landscape with Gilpin and Kimper soils. Gilpin and Kimper soils are fine-loamy. Gilpin soils have argillic horizons.

Typical pedon of Summers very flaggy loam in an area of Gilpin-Summers-Kimper complex, 20 to 55 percent slopes, very stony; on a wooded ridgetop on Black Mountain at Elk Pond, 100 feet north of an unimproved road and the boundary with Virginia, 4 miles southwest of Eolia, in Letcher County; USGS Whitesburg quadrangle; lat. 37 degrees 00 minutes 16 seconds N. and long. 82 degrees 49 minutes 24 seconds W.

Oi—4 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 6 inches; very dark gray (10YR 3/1) very flaggy loam, brown (10YR 4/3) dry; weak fine granular structure; friable; many fine and medium roots; 35 percent sandstone flagstones and 15 percent sandstone channers; strongly acid; clear wavy boundary.

AB—6 to 13 inches; dark brown (10YR 3/3) very flaggy loam, brown (10YR 5/3) dry; weak fine granular structure; friable; many fine to coarse roots; 45 percent sandstone flagstones and 10 percent sandstone channers; strongly acid; clear smooth boundary.

Bw1—13 to 22 inches; brown (10YR 4/3) very flaggy loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; 35 percent sandstone flagstones and 20 percent sandstone channers; strongly acid; clear smooth boundary.

Bw2—22 to 28 inches; dark yellowish brown (10YR 4/4) very channery loam; moderate medium subangular and angular blocky structure; firm; very few very fine roots; 40 percent sandstone channers; strongly acid; abrupt smooth boundary.

C—28 to 35 inches; yellowish brown (10YR 5/6) very flaggy loam; massive; firm; 45 percent sandstone flagstones and channers; strongly acid; abrupt smooth boundary.

R—35 inches; fractured sandstone.

Solum thickness and depth to bedrock range from 20 to 40 inches. The content of rock fragments ranges from 20 to 50 percent in the upper horizons and is as much as 70 percent in the lower horizons. Hard sandstone is at a depth of 20 to 40 inches. Reaction is strongly acid or very strongly acid.

The A and AB horizons have hue of 10YR, value of

2 or 3, and chroma of 1 to 3. The fine-earth texture is loam.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The fine-earth texture is loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 6. The fine-earth texture is loam.

The bedrock is dominantly fractured sandstone, but in places it is siltstone.

Udorthents

Udorthents consist of a mixture of soil and rock material that has been drastically disturbed. In most places, the soil material has been transported several hundred yards from cut areas to a fill site. Most areas of Udorthents are along Highway 80 in Knott County and Highways 15 and 119 in Letcher County. Other small areas have be delineated along major streams where hillsides have been cut and valleys filled for mining, residential, or commercial development. Slopes range from 0 to 30 percent. Udorthents are associated on the landscape with Grigsby and Holly soils on flood plains and Rowdy soils on low-lying stream terraces.

Because Udorthents material is highly variable, a typical pedon is not given. Udorthents generally have bedrock at a depth of 5 to 30 feet or more. Rock fragments make up about 5 to 75 percent of the profile and range in size from a few inches to more than 5 feet. They are dominantly sandstone, siltstone, or shale that is randomly oriented. The percent varies greatly with depth. In many areas, rock fragments bridge voids because of placement. This leaves discontinuous, irregular pores that are larger than texture porosity. Such voids are variable in size, frequency, and prominence.

The fine-earth texture is also highly variable. Clay content ranges from about 5 to 45 percent, and sand content ranges from about 25 to 80 percent. Reaction is very strongly acid to moderately alkaline.

The color range depends upon the parent rock and soil material. Hue is generally 5YR to 5Y. Mottling occurs without regard to depth or spacing of material.

Artifacts, including paper, scrap metal, wood, and glass, commonly have been disposed of by depositing them on or burying them within areas of Udorthents.

Varilla Series

The Varilla series consists of very deep, somewhat excessively drained soils that formed in colluvium weathered from acid sandstone. Permeability is moderately rapid. These soils are in deeply incised ravines on the southeast-facing side of Pine Mountain, generally below sandstone cliffs. Slopes are complex and range from 35 to 75 percent. Varilla soils are loamy-skeletal, siliceous, mesic Typic Dystrochrepts.

Varilla soils are associated on the landscape with Alticrest, Helechawa, Jefferson, Ramsey, and Wallen soils. Alticrest and Helechawa soils are coarse-loamy. Jefferson soils are fine-loamy. Ramsey soils are shallow. Wallen soils are moderately deep.

Typical pedon of Varilla channery sandy loam in an area of Varilla-Jefferson-Alticrest complex, 35 to 75 percent slopes, very rocky; in a wooded southeast-facing cove on the dip face of Pine Mountain, 200 feet south of Kentucky Highway 119, about 1.5 miles northwest of Eolia, in Letcher County; USGS Whitesburg quadrangle; lat. 37 degrees 04 minutes 08 seconds N. and long. 83 degrees 48 minutes 18 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery sandy loam, brown (10YR 4/3) dry; weak fine granular structure; very friable; common fine and few medium roots; 25 percent sandstone channers; extremely acid; clear smooth boundary.

BA—3 to 8 inches; yellowish brown (10YR 5/4) channery sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; 20 percent sandstone channers; strongly acid; clear wavy boundary.

Bw1—8 to 14 inches; yellowish brown (10YR 5/6) channery sandy loam; weak fine and medium subangular blocky structure; friable; few fine and medium roots; 10 percent sandstone channers and 5 percent quartzite pebbles; very strongly acid; clear smooth boundary.

Bw2—14 to 28 inches; yellowish brown (10YR 5/6) very channery sandy loam; moderate medium subangular blocky structure; friable; few fine, medium, and coarse roots; 40 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw3—28 to 35 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak medium and coarse subangular blocky structure; friable; few fine and medium roots; 50 percent sandstone channers; very strongly acid; clear smooth boundary.

BC—35 to 43 inches; yellowish brown (10YR 5/6) extremely channery sandy loam; weak fine subangular blocky structure; friable; 60 percent sandstone channers; very strongly acid; gradual smooth boundary.

CB—43 to 65 inches; yellowish brown (10YR 5/6) extremely channery sandy loam; weak coarse

subangular blocky structure; friable; 65 percent sandstone channers; very strongly acid; gradual smooth boundary.

C—65 to 75 inches; yellowish brown (10YR 5/6) extremely channery loamy sand; single grain; loose; 50 percent sandstone channers and 20 percent sandstone flagstones; very strongly acid.

Solum thickness ranges from 40 to more than 60 inches. Depth to bedrock is greater than 60 inches. Rock fragments, dominantly channers, make up 15 to 75 percent of the B horizon and 35 to 90 percent of the CB and C horizons. Quartzite pebbles make up 0 to 15 percent of all horizons. Reaction ranges from extremely acid to strongly acid. In some pedons, however, the A horizon is moderately acid or slightly acid.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3. The fine-earth texture is sandy loam or fine sandy loam.

The BA horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is sandy loam, fine sandy loam, or loam.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. The fine-earth texture is sandy loam, loam, or loamy sand.

Most pedons have BC, CB, and C horizons. These horizons have colors and textures similar to the Bw horizon.

Wallen Series

The Wallen series consists of moderately deep, somewhat excessively drained soils that formed in residuum weathered from acid sandstone. Permeability is moderately rapid. These soils are on narrow ridges on the southeast-facing side of Pine Mountain in southern Letcher County. Slopes are irregular and broken by tilted sandstone rock outcrops and range from 20 to 55 percent. Wallen soils are loamy-skeletal, siliceous, mesic Typic Dystrochrepts.

Wallen soils are associated on the landscape with Alticrest, Helechawa, Jefferson, Ramsey, and Varilla soils. Alticrest and Helechawa soils are coarse-loamy. Jefferson soils are fine-loamy. Ramsey soils are loamy and shallow. Varilla soils are very deep.

Typical pedon of Wallen channery sandy loam in an area of Alticrest-Ramsey-Wallen complex, 20 to 55 percent slopes, rocky; on a wooded shoulder slope on the dip slope of Pine Mountain, 200 feet east of Kentucky Highway 119, about 200 feet west of Presley House Branch, 5 miles south of Whitesburg, in Letcher County; USGS Whitesburg quadrangle; lat. 37 degrees 04 minutes 11 seconds N. and long. 82 degrees 48 minutes 03 seconds W.

Oi—2 inches to 0; undecomposed and partially decomposed hardwood leaf litter; abrupt wavy boundary.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) channery sandy loam; weak fine granular structure; very friable; many fine and few medium roots; 20 percent sandstone fragments; very strongly acid; abrupt wavy boundary.

E—2 to 5 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine granular structure; very friable; common fine and medium roots; 10 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw1—5 to 11 inches; yellowish brown (10YR 5/6) very channery sandy loam; moderate fine and medium subangular blocky structure; very friable; few fine, medium, and coarse roots; 40 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw2—11 to 19 inches; brownish yellow (10YR 6/6) very channery sandy loam; weak fine subangular blocky structure; friable; few fine, medium, and coarse roots; 60 percent sandstone channers; very strongly acid; clear smooth boundary.

BC—19 to 24 inches; brownish yellow (10YR 6/6) very channery sandy loam; weak medium subangular blocky structure; friable; few fine roots; 60 percent sandstone channers; very strongly acid; abrupt smooth boundary.

R—24 inches; fractured sandstone.

Solum thickness and depth to bedrock range from 15 to 40 inches. The content of weathered sandstone channers, flagstones, and quartzite pebbles ranges from 20 to 35 percent in the A horizon and from 35 to 70 percent in the B and C horizons. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. The fine-earth texture is sandy loam. Some pedons do not have an A horizon.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. The fine-earth texture is sandy loam or loam.

The Bw horizon has hue of 10YR and value and chroma of 4 to 6. The fine-earth texture is sandy loam or loam.

The bedrock is sandstone of varying hardness and is commonly fractured without displacement.

Formation of the Soils

This section describes the geology and geomorphology of the survey area. It also describes the five major factors of soil formation.

Geology

The upland soils of Knott and Letcher Counties are underlain by interbedded sandstone, siltstone, shale, and limestone of the Pennsylvanian and Mississippian Systems. Soils on flood plains and stream terraces, such as Allegheny or Rowdy soils, formed in quaternary alluvial sediments (McFarlan 1943).

The most extensive geology in the survey area is the horizontally level-bedded sedimentary rocks of the Breathitt Formation. These rocks are of the Pennsylvanian System and are thought to be about 300 million years old. Major rock strata consist of sandstone, shale, siltstone, and coal interspersed with narrow beds of calcareous shale or limestone. Materials forming shale and siltstone accumulated as clay or mud on the flood plains and backswamps. Materials forming coal accumulated on extensive forested swampy lowlands. Coal seams in the survey area are generally overlain by marine shale and limestone because of subsidence of the coal-forming forested swamps and the subsequent submersion in seawater. Clay and silt were deposited and calcium carbonates precipitated as a result of this submersion. As these areas uplifted, coal-forming swamps were reestablished. These long cycles of subsidence and uplift lasted for millions of years. The underclay associated with most coal seams is thought to be an ancient soil on which the coal-forming forests grew (Bates and Sweet 1966).

The Breathitt Formation is commonly subdivided into three sections (McDowell, Grabowski, and Moore 1981). These subdivisions are generalized, since all strata of the Breathitt Formation are discontinuous and may be locally absent because of channel cutting. The upper part of the Breathitt Formation is mostly sandstone, but thin strata of shale and siltstone, as well as significant amounts of coal, are also present. The most extensive areas of upper Breathitt geology in this survey area are the ridgetops of Chestnut Mountain and Yellow Mountain in Knott County. The middle part of the Breathitt Formation is sandstone, siltstone, shale, and coal with sandstone becoming more common in northern and western Knott County. The lower part of the Breathitt Formation is mostly shale and siltstone with some strata of argillaceous limestone and calcareous shale of marine origin (Morse 1931). Cloverlick, Dekalb, Gilpin, Handshoe, Highsplint, Kimper, Marrowbone, Rayne, and Shelocta soils are examples of soils weathered from strata of the Breathitt Formation.

Pine Mountain is the dominant landscape feature in southern and eastern Letcher County. This linear mountain lies in a northwest to southwest direction and extends about 120 miles. Pine Mountain is the leading edge of a thrust fault created during the uplift of the Appalachian Mountains to the east.

The Lee Formation forms most of the upper and middle slopes on the southeast-facing side, or dip slope, of Pine Mountain. This formation is the lowest member of the Pennsylvanian System and consists of sandstone and conglomerate that are very resistant to weathering. The Lee Formation is thought to have formed in a Paleoriver that ran the length of the present Appalachian Mountain chain and rivaled the Amazon in size (Rice 1984). Alticrest, Helechawa, Jefferson, Ramsey, Varilla, and Wallen soils are examples of soils formed in material weathered from the Lee Formation.

On the steeper northwest side, or scarp face, of Pine Mountain, the faulting process has exposed rock formations that are normally 2,000 feet below the surface. All three geologic systems are exposed on the side of the mountain. Where the Lee Formation has been removed by erosion on the highest summits, the Pennington Formation is exposed. The Pennington Formation is the uppermost member of the Mississippian System and consists of mainly sandstone and siltstone. Resistant strata of the Pennington Formation form an outcrop of jointed cliffs and bluffs, some as much as 80 feet high on these steep slopes on Pine Mountain. Backweathering in the Pennington Formation has formed such landforms as cuestas and deep coves, such as Scuttlehole Gap. The lower part of the Pennington Formation, below the resistant rock bluff, includes interbedded sandstone and shale (fig. 27) that give rise to narrow benches that

are commonly covered with rock debris and soils that commonly have surface horizons that are rich in organic material. Berks, Cloverlick, Kimper, and Renox soils are examples of soils formed in material weathered from the Pennington Formation.

Other Mississippian geology on the scarp face of Pine Mountain includes the Newman Limestone and the Grainger Formation. The Newman Limestone commonly forms cliffs and ledges of limestone rock outcrop and narrow, step-like benches. Colluvium weathered from the Newman Limestone is typically higher in clay content and commonly slips downslope, covering and mixing with residuum weathered from the Grainger Formation. Caneyville and Bledsoe soils are examples of soils formed in material weathered from the Newman Limestone.

The Grainger Formation is made up of siltstone and interstratified clay shale and forms very steep slopes that are dominantly covered with colluvium. The Grainger Formation is the lowermost member of the Mississippian System and grades into the Sunbury Shale of the Devonian System. The Berea Sandstone, the Bedford Shale, and the Ohio Shale are also part of the Devonian System, which forms the footslope of Pine Mountain. Muse and Shelocta soils are examples of soils that formed in material weathered from these formations.

The Devonian-aged strata are exposed along most of the length of the scarp face of Pine Mountain in Letcher County. However, in some areas, these strata dip below the base of the mountain near the heads of Kings Creek, Bo Fork, and Big Cowan Creek. Intensely deformed areas of the Breathitt Formation also occur in a narrow band at the base of Pine Mountain.

Figure 27.—These tilted strata of the Mississippian-aged Pennington Formation on Pine Mountain are made up mostly of interbedded sandstone and shale.

Geomorphology

Knott and Letcher Counties are located in the Eastern Kentucky Coalfields Physiographic Region, also known as the Cumberland Plateau or Cumberland Mountains (University of Kentucky and USDA 1970). The highly dissected region is primarily the result of downcutting streams. The survey area is characterized by narrow ridges and stream bottoms and steep side slopes. Landscapes with slopes of more than 15 percent occur in about 90 percent of the area.

Mean elevations are higher in Knott and Letcher Counties than in surrounding counties, resulting in the occurrence of several stream headwaters. The majority of the survey area drains to the west and northwest into the North Fork of the Kentucky River. Major stream watersheds include Carr Fork, Troublesome Creek, Lotts Creek, and Quicksand Creek in Knott County and the North Fork of the Kentucky River in Letcher County. The eastern part of Knott County drains to the north into the Levisa Fork of the Big Sandy River. The Right Fork of Beaver Creek is the main watershed in that area. The Poor Fork of the Cumberland River drains the far southern part of Letcher County from the ridgeline of Pine Mountain to the crest of Black Mountain. This watershed drains to the southwest into

the Cumberland River in Harlan County. Elkhorn Creek, at the base of Pine Mountain near Jenkins, drains a small area in the far eastern part of Letcher County. This watershed drains to the northwest into the Russell Fork of the Big Sandy River. As the streams in the region have deepened their valleys, they have also lengthened them by eroding their upstream ends. Small drainageways have slowly developed into young tributary valleys. The branching pattern of these valleys, known as a dendritic drainage pattern, grows headward at the expense of the original land surface. As the streams carry material away, downslope movements of newly weathered colluvium sharpen the ridgetops into narrow divides. This process of regional reduction has left few remnants of the original land surface and caused the high relief characteristics throughout Knott and Letcher Counties (Bates and Sweet 1966).

All of the rock strata in eastern Kentucky, with the exception of those that make up Pine Mountain and Black Mountain, tilt slightly to the northwest. Because of this tilt, groundwater movement is generally in the direction of the tilt. This results in more springs and seeps on the lower slopes of northwest-facing hills than on other slope aspects. Slippage or landsliding is more likely to occur on these slopes following heavy rains due to saturation of the soil above the bedrock contact. Differences in weathering resistance of the rock strata create variations in the landscape, such as benches, nose slopes, and saddles, and result in significant differences in relief between watersheds. Variations in depth, texture, and volume of rock fragments are common over short distances where mixing colluvium creeps or slides down steep slopes. The occurrence of resistant sandstone and non-resistant strata, such as soft shale and coal seams, influences the distribution of scarps and benches and accounts for the stepped or benched slope profiles. Many of these benches and drainageways are resting points for masses of soil and rock materials deposited by landslides, slippage, or slow downward mass movement, known as soil creep.

Factors of Soil Formation

The characteristics of a soil at any given point on the landscape depend on the physical and chemical composition of the parent material and on climate, relief, plant and animal life, and time. Soils form by the interaction of these five factors. The relative importance of each factor differs from one soil to another. In some areas one factor may dominate the formation of soil characteristics, and in other areas another factor may dominate. In Knott and Letcher Counties, climate and the effect of plant and animal life do not vary greatly but there are differences in relief and parent material.

Parent Material

Parent material is the raw material acted on by the soil-forming processes. It largely determines soil texture, drainage, and permeability. The physical and chemical composition of parent material has an important effect on the kind of soil that forms.

The soils in Knott and Letcher Counties formed from sedimentary layers of sandstone, shale, siltstone, calcareous shale, or limestone. A soil that formed in material that was weathered from bedrock in place, such as on ridgetops, is known as a soil formed in residuum. Gilpin and Rayne are examples of soils formed in residuum. Other soils formed in colluvium, which is material that moved down a hillside by gravity, or in alluvium, which is material deposited by streams and rivers. Shelocta and Bledsoe soils formed in colluvium, and Grigsby and Rowdy soils formed in alluvium.

Relief

Relief influences soil formation through its effect on drainage, erosion, and exposure to sunlight. Surface runoff can differentiate soils that formed in the same kind of parent material. Relief can affect erosion and, therefore, soil depth. Soils on narrow ridgetops and upper side slopes, such as Dekalb and Marrowbone, are generally less than 40 inches deep over bedrock. Soils on lower mountainsides, such as Shelocta and Handshoe, are generally more than 40 inches deep over bedrock. Erosion generally removes soil material from higher-lying soils that formed in residuum. It also removes soil material from the colluvial soils on mountainsides, but the colluvial soils generally continue to receive soil material from the higher-lying soils.

Water that runs off the higher, more sloping soils can collect in depressions and abandoned stream channels. Allegheny and Holly soils formed in loamy alluvium. The gently sloping to moderately steep, well drained Allegheny soils are on alluvial terraces that have convex slopes. The nearly level and poorly drained Holly soils are on flood plains. Holly soils receive runoff from the higher adjacent soils on hillsides while Allegheny soils receive much less runoff.

Aspect of the steep and very steep mountainsides has a pronounced effect on soil development. Soils on steep, north- or east-facing mountainsides receive less

exposure to sunlight than soils on south- or west-facing slopes and in coves. These soils have lower soil temperatures, which slow the decomposition of leaf litter and allow organic matter to accumulate. Cloverlick and Kimper soils formed in areas of high relief and cool aspect.

Climate

Climate affects the physical, chemical, and biological relationships in the soil. It influences the kind and number of plants and animals on and in the soil, the weathering and decomposition of rocks and minerals, the susceptibility of the soil to erosion, and the rate of soil formation.

The climate of Knott and Letcher Counties is humid and temperate. The average annual precipitation is 40.1 inches, and the mean annual air temperature is 54.6 degrees F. In this environment, alternate periods of freezing and thawing result in physical and chemical weathering of the parent material, accumulation of organic matter, decomposition of minerals, the formation and translocation of clay, and the leaching of soluble compounds. Aspect can affect soil temperature and moisture. South- and west-facing slopes, which receive more direct radiation from the sun, are hotter and drier than north- and east-facing slopes. The coolest sites are on the lower slopes that face east to north and in coves. Kimper soils on cool aspects have an A horizon that is thicker and darker than that of Fedscreek and Handshoe soils on warm aspects.

Living Organisms

All living organisms, such as vegetation, bacteria, fungi, and animals, including humans, actively affect the formation of soils. Vegetation generally supplies the organic matter that decomposes and gives soils a dark surface layer. The decomposed organic matter, or humus, also aids in the formation of soil structure. Larger vegetation, such as trees, transfers and cycles nutrients from the subsoil to the surface layer and acts as a storehouse for nutrients such as phosphorous, potassium, and calcium. Bacteria and fungi decompose the organic matter and release nutrients into the soil. Worms, insects, and burrowing animals mix the soils and thus improve tilth and porosity.

Most soils in Knott and Letcher Counties formed under hardwood forest. These soils are characterized by a thin, dark surface layer and a brighter colored subsoil. Local differences in drainage, composition of plant species, parent materials, aspect, elevation, and associated ground cover, however, cause variations in soils. Kimper soils, for example, have a dark surface layer that is commonly about 7 inches thick and is mostly on north- or east-facing slopes throughout the survey area. The cool aspects, lower soil temperatures, and favorable moisture conditions on these slopes slow the microbial decay of leaf litter and allow the accumulation of organic matter in the surface layer. Fedscreek soils are an example of soils that formed on somewhat warmer aspects, where temperatures are higher and greater microbial decay of leaf litter occurs. These soils have a thinner, lighter colored surface horizon than Kimper soils.

The physical properties of soils are also affected by tillage and management practices. Soils can be altered chemically by the use of lime, fertilizer, insecticides, and herbicides. Operating vehicles on the soil surface compacts the soil and can lead to the formation of dense layers, or traffic pans. Humans have greatly influenced the surface layer and the soil environment by clearing the forested areas and plowing. They have mixed the soil layers, moved soil from one place to another, added fertilizers and lime, and introduced new plant species. Because of accelerated erosion, most of the original surface layer in some places has been removed, exposing the less productive subsoil.

Surface mining and the practice of filling flood plains with soil material has resulted in the formation of new soils in the survey area. Heavy equipment was used to remove the native soil and rock and reshape the soil material. These soils are subject to severe erosion, and their physical, chemical, and mineralogical properties generally vary greatly within a few yards on the surface and within a few inches in the surface layer. Kaymine soils, which formed because of surface mining, are extensive in the survey area.

Time

The formation of soil is strongly influenced by the length of time that the parent material has been exposed to the active forces of climate and living organisms. The relative stability of landform positions influences the amount of time soil-forming processes can act on parent material and soils.

The soils of Knott and Letcher Counties are relatively young. As weathering processes act upon the exposed rocks, especially on convex ridetops, shoulder slopes, and nose slopes, the residue is subjected to the forces of gravity. Weathered soil material and rock fragments are carried downslope and deposited as colluvium.

An even longer period is required for distinct soil profiles to develop. Where colluvial deposits become thicker, the weight of the colluvium, the steep angle of

slope, and the subsurface water moving along the bedrock tend to move the mass very slowly and irregularly downslope onto the flood plain. Soil is removed from the valleys by the action of streams. Thus, the valleys slowly become wider while the mountains and hills become smaller.

Some soils on convex ridgetops, shoulders, and steep side slopes have developed structure and a B horizon that is well defined by color, but they have little illuvial clay accumulation. These landforms are relatively unstable because erosion generally removes soil materials from the surface about as fast as the bedrock weathers to form soil materials. Dekalb and Marrowbone soils are classified as Typic Dystrochrepts.

Some soils on less sloping ridgetops and lower side slopes have a thick, well defined B horizon that has a significant accumulation of illuvial clay. These landforms are relatively stable because erosion and deposition are minor processes compared to internal soil development processes. Gilpin and Shelocta soils have a B horizon with a significant accumulation of illuvial clay and are considered relatively more mature. These soils are classified as Typic Hapludults.

Soils in valleys are divided into those on flood plains and those on stream terraces. Grigsby soils on flood plains formed in recent alluvial deposits along streams. These soils have some development of structure in the subsoil but no significant accumulation of illuvial clay. Allegheny soils, however, formed in older, more stable alluvial deposits on stream terraces that are no longer subject to flooding. Allegheny soils are more highly leached and weathered and have a well developed subsoil that has a significant accumulation of illuvial clay. Rowdy soils are classified as Fluventic Dystrochrepts, and Allegheny soils are classified as Typic Hapludults.

Soils such as Kaymine and Fairpoint consist of heterogeneous geologic material deposited from coal mining activities. These soils show very little alteration other than the breakdown of rock fragments into smaller particles and the accumulation of organic matter in the surface horizon. The C horizon in these soils extends nearly to the surface and is subdivided based on texture, percentage of rock fragments, and reaction. Most of these soils have an A horizon, and many have thin O horizons at the surface. The action of earthworms and plant roots causes several changes in the soil, such as the development of structure in surface and subsurface horizons and the thickening of the A horizon. Such changes are often observed after these soils have been in place for several years. Kaymine and Fairpoint soils are classified as Udorthents.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone. The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvial (geomorphology). Pertaining to material or processes associated with transportation and deposition of running water.

Alluvial terrace (geomorphology). See Stream terrace.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces. Warm aspects have slopes of more than 15 percent and face an azimuth of 135 to 315 degrees. Cool aspects have slopes of more than 15 percent and face an azimuth of 315 to 135 degrees.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5 millimeters

thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench (landform). A relatively flat, horizontal, long and narrow surface which is bounded on one side by a steeper ascending slope and on the other side by a steeper descending slope.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Break (slopes). An abrupt change or inflection in a slope of profile.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low

content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cove (landform). The area of rounded concave slopes at the head of a narrow steep valley, sometimes directly below a head slope, at the end of a drainageway.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crest (landform). The highest line of a ridgetop from which the surface slopes downward in opposite directions.

Cropping system. Growing crops according to a

planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cuesta. A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Culmination of the mean annual increment (forestry). The volume of a stand of trees of a particular species at the point of highest average annual growth.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway (landform). A relatively small, linear depression that, at some time, carries water and either lacks a defined channel or only has a small defined channel.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting

snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Fine earth. Portion of the soil finer than a No. 10 (2 millimeter) U.S. standard sieve.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers

especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Geomorphology. The science that treats the general configuration of the earth's surface. Specifically, it is the study of the classification, description, nature, origin, and development of landforms, their relation to underlying geologic structures, and the history of geologic changes as recorded by these features.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Head slope (landform). The concave surface at the uppermost end of a drainageway, sometimes directly above or on the upper slopes of a cove, where the flow of all water converges downward.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Highwall (man-made landform). A vertical rock wall, exposed during surface mining for coal, that ranges from a few feet to about 80 feet high.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Hillside (colloquial; southern U.S.A.). The steeper part of a hill between its ridgetop and any drainageway or stream. Hillside positions include shoulder slopes, side slopes, benches, head slopes, coves, and footslopes. Complex hillsides may include crests, nose slopes, saddles, and some shoulder slopes and head slopes.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay,

sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landform (geomorphology). Any physical recognizable form or feature on the earth's surface having a characteristic shape and produced by natural causes.

Landscape (geomorphology). A collection of related natural landforms; usually the land surface which the eye can comprehend in a single view.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Limestone (geology). A sedimentary rock consisting chiefly of calcium carbonate (more than 50 percent), primarily in the form of calcite. Limestone is usually formed by a combination of organic and inorganic processes that include chemical and clastic (soluble and insoluble) constituents. Many limestones contain fossils.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil,

including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

No-tillage systems (agronomy). Planting a crop in undisturbed soil, with at least 90 percent residue cover left on the surface after planting.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher-lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings. Zones of iron or manganese accumulation that may be either coatings on pore surfaces or impregnations of the matrix adjacent to the pore.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in

situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridgetop (landform). A long, narrow elevation of the land surface, usually sharp crested with steep sides and forming an extended upland between valleys. Ridgetop positions include crests, nose slopes, saddles, and some shoulder slopes and head slopes.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble (geology). An accumulation of loose angular rock fragments, commonly overlying rock outcrop or collecting on a bench or in a drainageway.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saddle (landform). A low point on a ridgetop, commonly at a divide between the heads of streams flowing in opposite directions.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay

(0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2
Gently sloping	2 to 6
Sloping	6 to 12
Moderately steep	12 to 20
Steep	20 to 30
Very steep	30 to 70

Slough (landform). A sluggish channel of water, such as a side channel of a river or stream, in which water flows slowly through low, swampy ground; or a section of an abandoned river channel that may contain stagnant water.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Slumping. A mass movement process characterized by a landslide and involving a shearing of a generally independent mass of rock and soil along a curved slip face.

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil depth classes. Terms used in this survey to describe soil depth are:

Shallow	less than 20 inches deep
Moderately deep	20 to 40 inches deep
Deep	40 to 60 inches deep
Very deep	more than 60 inches deep

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies

material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace (geomorphology). One of a series of platforms in the stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream and representing the dissected remnants of an abandoned flood plain, stream bed, or valley floor produced during a former stage of deposition and erosion. Erosional surfaces that cut into bedrock and are thinly mantled with stream deposits (alluvium) are designated "strath terraces." Remnants of constructional valley floors are termed "alluvial terraces" or simply stream terraces.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a

hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tributary. A river or stream flowing into a larger river or stream.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Valley floor (landform). A general term for the nearly level to gently sloping, lowest surface of a valley that includes the flood plain, low stream terraces, and alluvial fans.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.—Temperature and Precipitation

(Recorded in the period 1961-90 at Baxter and Jeremiah, Kentucky)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temp. higher than--	2 years in 10 will have-- Minimum temp. lower than--	Average no. of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average no. of days with 0.10 in. or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January--	43.4	21.9	32.6	68	-8	49	2.90	1.52	4.12	6	3.0
February-	47.6	24.3	36.0	72	-1	74	3.17	1.99	4.24	6	4.2
March----	58.1	32.3	45.2	81	11	218	4.02	1.95	5.82	7	0.4
April----	68.3	40.0	54.2	88	23	431	3.29	1.68	4.69	6	0.1
May------	76.4	49.7	63.0	89	31	712	3.90	1.94	5.59	7	0.0
June-----	83.1	58.3	70.7	94	43	916	3.40	1.45	5.05	6	0.0
July-----	86.1	62.9	74.5	95	50	1,068	3.80	2.48	5.01	6	0.0
August---	85.2	62.1	73.7	95	48	1,043	3.34	1.64	4.81	5	0.0
September	79.3	55.8	67.5	91	39	822	3.23	1.59	4.66	5	0.0
October--	68.7	42.6	55.7	84	24	487	2.80	1.56	4.30	5	0.0
November-	58.2	33.7	45.9	77	15	221	3.21	1.65	4.57	6	0.7
December-	47.5	26.1	36.8	71	1	88	3.02	1.42	4.39	5	3.7
Yearly:											
Average	66.8	42.5	54.6	---	---	---	---	---	---	---	---
Extreme	101	-19	---	96	-10	---	---	---	---	---	---
Total--	---	---	---	---	---	6,128	40.07	28.18	47.48	70	12.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Baxter, Kentucky)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 10	Apr. 23	May 11
2 years in 10 later than--	Apr. 4	Apr. 18	May 5
5 years in 10 later than--	Mar. 23	Apr. 10	Apr. 25
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 23	Oct. 17	Oct. 7
2 years in 10 earlier than--	Oct. 30	Oct. 22	Oct. 12
5 years in 10 earlier than--	Nov. 12	Nov. 2	Oct. 21

Table 3.—Growing Season

(Recorded in the period 1961-90 at Baxter, Kentucky)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	210	188	159
8 years in 10	218	194	166
5 years in 10	233	205	179
2 years in 10	249	217	192
1 year in 10	257	223	199

Table 4.—Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Knott County	Letcher County	Total Area	Total Extent
		Acres	Acres	Acres	Pct
AlC	Allegheny loam, 2 to 15 percent slopes	59	406	465	0.1
AtF	Alticrest-Ramsey-Wallen complex, 20 to 55 percent slopes, rocky	0	3,492	3,492	0.8
BcG	Berks-Caneyville complex, 50 to 120 percent slopes, very rocky	0	201	201	*
CbF	Caneyville-Renox-Bledsoe complex, 50 to 80 percent slopes, extremely stony	0	1,921	1,921	0.4
CgF	Cloverlick-Guyandotte-Highsplint complex, 35 to 80 percent slopes, very stony	0	7,249	7,249	1.6
CkF	Cloverlick-Kimper-Highsplint complex, 30 to 65 percent slopes, very stony	33,014	43,616	76,630	17.3
CsF	Cloverlick-Shelocta-Kimper complex, 20 to 70 percent slopes, stony	41,238	16,669	57,907	13.1
DAM	Dam, large earthen	24	10	34	*
DgF	Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very rocky	30,750	10,764	41,514	9.4
DrF	Dekalb-Gilpin-Rayne complex, 25 to 65 percent slopes, very rocky	18,400	27,937	46,337	10.5
FaF	Fedscreek-Shelocta-Handshoe complex, 30 to 80 percent slopes, very stony	25,973	17,300	43,273	9.8
FkE	Fiveblock and Kaymine soils, 0 to 30 percent slopes, stony	3,400	2,204	5,604	1.3
GlD	Gilpin-Shelocta complex, 12 to 25 percent slopes	82	647	729	0.2
GmF	Gilpin-Summers-Kimper complex, 20 to 55 percent slopes, very stony	0	2,784	2,784	0.6
Gr	Grigsby sandy loam, occasionally flooded	1,251	1,331	2,582	0.6
GuB	Grigsby-Urban land complex, 0 to 6 percent slopes, occasionally flooded	1,639	1,982	3,621	0.8
HaF	Handshoe-Fedscreek-Marrowbone complex, 30 to 80 percent slopes, very stony	18,913	0	18,913	4.3
HeF	Helechawa-Varilla-Jefferson complex, 35 to 75 percent slopes, very rocky	0	1,186	1,186	0.3
HsF	Highsplint-Shelocta-Dekalb complex, 35 to 80 percent slopes, very stony	0	1,981	1,981	0.4
HtF	Highsplint-Shelocta-Muse complex, 30 to 80 percent slopes, extremely stony	0	990	990	0.2
Hy	Holly loam, frequently flooded	0	84	84	*
ImF	Itmann very channery sandy loam, 4 to 80 percent slopes	167	473	640	0.1
KfF	Kaymine, Fairpoint, and Fiveblock soils, benched, 2 to 70 percent slopes, very stony	15,449	15,879	31,328	7.1
KrF	Kimper-Cloverlick-Renox complex, 30 to 80 percent slopes, extremely stony	0	3,478	3,478	0.8
Pt	Pits, quarries	0	424	424	0.1
RgB	Rowdy-Grigsby complex, 0 to 4 percent slopes, occasionally flooded	2,031	2,197	4,228	1.0
ShF	Shelocta-Highsplint complex, 30 to 65 percent slopes, very stony	28,034	41,584	69,618	15.7
SmF	Shelocta-Muse complex, 15 to 50 percent slopes, very stony	0	201	201	*
UdE	Udorthents-Urban land complex, steep	1,807	2,026	3,833	0.9
UrC	Urban land-Udorthents complex, 0 to 15 percent slopes	504	2,063	2,567	0.6
UuB	Urban land-Udorthents-Grigsby complex, 0 to 6 percent slopes, rarely flooded	2,489	2,683	5,172	1.2
VaF	Varilla-Jefferson-Alticrest complex, 35 to 75 percent slopes, very rocky	0	3,122	3,122	0.7
W	Water	767	108	875	0.2
	Total	225,991	216,992	422,983	100.0

* Less than 0.05 percent.

Table 5.—Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Alfalfa hay	Grass legume hay	Pasture
		Bu	Bu	Lb	Bu	Ton	Ton	AUM*
AlC:								
Allegheny-----	IIIe	110	30	2,500	35	3.0	3.5	7.0
AtF:		---	---	---	---	---	---	---
Alticrest-----	VIIe							
Ramsey--------	VIIe							
Wallen--------	VIIe							
BcG:		---	---	---	---	---	---	---
Berks---------	VIIe							
Caneyville----	VIIe							
CbF:		---	---	---	---	---	---	---
Caneyville----	VIIe							
Renox---------	VIIe							
Bledsoe-------	VIIe							
CgF:		---	---	---	---	---	---	---
Cloverlick----	VIIe							
Guyandotte----	VIIe							
Highsplint----	VIIe							
CkF:		---	---	---	---	---	---	---
Cloverlick----	VIIe							
Kimper--------	VIIe							
Highsplint----	VIIe							
CsF:		---	---	---	---	---	---	---
Cloverlick----	VIIe							
Shelocta------	VIIe							
Kimper--------	VIIe							
DAM**.								
Dam								
DgF:		---	---	---	---	---	---	---
Dekalb--------	VIIe							
Gilpin--------	VIIe							
Marrowbone----	VIIe							
DrF:		---	---	---	---	---	---	---
Dekalb--------	VIIe							
Gilpin--------	VIIe							
Rayne---------	VIIe							
FaF:		---	---	---	---	---	---	---
Fedscreek-----	VIIe							
Shelocta------	VIIe							
Handshoe------	VIIe							
FkE:		---	---	---	---	---	---	---
Fiveblock-----	VIs							
Kaymine-------	VIs							

See footnotes at end of table.

Table 5.—Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Alfalfa hay	Grass legume hay	Pasture
		Bu	Bu	Lb	Bu	Ton	Ton	AUM*
GlD:		80	30	2,000	30	2.0	2.5	6.5
Gilpin--------	IVe							
Shelocta------	IVe							
GmF:		---	---	---	---	---	---	---
Gilpin--------	VIIe							
Summers-------	VIIe							
Kimper--------	VIIe							
Gr:								
Grigsby-------	IIw	110	40	2,800	40	3.0	4.0	7.0
GuB:		---	---	---	---	---	---	---
Grigsby**-----	IIw							
Urban land----	VIIIs							
HaF:		---	---	---	---	---	---	---
Handshoe------	VIIe							
Fedscreek-----	VIIe							
Marrowbone----	VIIe							
HeF:		---	---	---	---	---	---	---
Helechawa-----	VIIe							
Varilla-------	VIIe							
Jefferson-----	VIIe							
HsF:		---	---	---	---	---	---	---
Highsplint----	VIIe							
Shelocta------	VIIe							
Dekalb--------	VIIe							
HtF:		---	---	---	---	---	---	---
Highsplint----	VIIe							
Shelocta------	VIIe							
Muse----------	VIIe							
Hy:								
Holly---------	IIIw	---	---	---	---	---	---	---
ImF:								
Itmann--------	VIIIs	---	---	---	---	---	---	---
KfF:		---	---	---	---	---	---	---
Kaymine-------	VIIs							
Fairpoint-----	VIIs							
Fiveblock-----	VIIs							
KrF:		---	---	---	---	---	---	---
Kimper--------	VIIe							
Cloverlick----	VIIe							
Renox---------	VIIe							
Pt**:								
Pits, quarries	VIIIs	---	---	---	---	---	---	---
RgB:		125	40	3,000	40	3.0	4.0	8.0
Rowdy---------	IIw							
Grigsby-------	IIw							

See footnotes at end of table.

Table 5.—Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Alfalfa hay	Grass legume hay	Pasture
		Bu	Bu	Lb	Bu	Ton	Ton	AUM*
ShF:		---	---	---	---	---	---	---
Shelocta	VIIe							
Highsplint	VIIe							
SmF:		---	---	---	---	---	---	---
Shelocta	VIIe							
Muse	VIIe							
UdE**:		---	---	---	---	---	---	---
Udorthents	VIs							
Urban land	VIIIs							
UrC**:		---	---	---	---	---	---	---
Urban land	VIIIs							
Udorthents	VIs							
UuB**:		---	---	---	---	---	---	---
Urban land	VIIIs							
Udorthents	VIs							
Grigsby	IIw							
VaF:		---	---	---	---	---	---	---
Varilla	VIIe							
Jefferson	VIIe							
Alticrest	VIIe							
W**. Water.								

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 6.—Capability Classes and Subclasses

(Miscellaneous areas are excluded. Dashes indicate no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I:				
Knott County	---	---	---	---
Letcher County	---	---	---	---
II:				
Knott County	4,720	---	4,720	---
Letcher County	5,218	---	5,218	---
III:				
Knott County	59	59	---	---
Letcher County	490	406	84	---
IV:				
Knott County	82	82	---	---
Letcher County	647	647	---	---
V:				
Knott County	---	---	---	---
Letcher County	---	---	---	---
VI:				
Knott County	5,357	---	---	5,357
Letcher County	4,741	---	---	4,741
VII:				
Knott County	211,771	196,322	---	15,449
Letcher County	200,354	184,475	---	15,879
VIII:				
Knott County	2,247	---	---	2,247
Letcher County	2,975	---	---	2,975

Table 7.—Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
AlC---------- Allegheny	Slight	Slight	Slight	Severe	Shortleaf pine--	80	130	Eastern white pine, yellow-poplar, black walnut, black cherry, shortleaf pine, white oak, northern red oak.
					Yellow-poplar---	93	95	
					Virginia pine---	72	112	
					White ash-------	---	---	
					Northern red oak	---	---	
					Pignut hickory--	---	---	
					Black oak-------	80	62	
					White oak-------	78	60	
AtF**:								
Alticrest---	Severe	Severe	Moderate	Moderate	Scarlet oak-----	60	43	Shortleaf pine, eastern white pine, Virginia pine, loblolly pine, black oak.
					Virginia pine---	60	91	
					Shortleaf pine--	60	88	
					Chestnut oak----	---	---	
Ramsey------	Severe	Severe	Severe	Slight	Shortleaf pine--	59	88	Eastern white pine, shortleaf pine, Virgnia pine, loblolly pine, black oak.
					Chestnut oak----	60	43	
					Eastern white pine-----------	70	---	
					Scarlet oak-----	60	43	
					Black oak-------	52	36	
					Virginia pine---	52	73	
Wallen------	Severe	Severe	Moderate	Slight	Shortleaf pine--	50	---	Shortleaf pine, Virginia pine, loblolly pine, eastern white pine, black oak.
					Virginia pine---	55	---	
					Scarlet oak-----	67	49	
					Chestnut oak----	59	42	
BcG**:								
Berks-------	Moderate	Severe	Slight	Moderate	Northern red oak	70	60	Shortleaf pine, eastern white pine, northern red oak, white oak, white ash, yellow-poplar.
					Black oak-------	80	62	
					American beach--	---	---	
					Scarlet oak-----	75	57	
					White oak-------	70	52	
					Yellow poplar---	98	104	
					Hickory---------	---	---	
Caneyville--	Severe	Severe	Slight	Severe	Black oak-------	71	53	White oak, yellow-poplar, white ash, eastern white pine, northern red oak.
					White oak-------	64	47	
					Hickory---------	---	---	
					White ash-------	72	---	
					Eastern redcedar	46	54	
					Yellow-poplar---	90	90	
					Sugar maple-----	---	---	
					Northern red oak	69	---	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
CbF**:								
Caneyville--	Severe	Severe	Slight	Severe	Black oak-------	71	53	White oak, yellow-poplar, white ash, eastern white pine, northern red oak.
					White oak-------	64	47	
					Sugar maple-----	---	---	
					Pignut hickory--	---	---	
					White ash-------	72	---	
					Eastern redcedar	46	54	
					Yellow-poplar---	90	90	
					American beech--	---	---	
Renox-------	Severe	Severe	Slight	Severe	Yellow-poplar---	94	97	Yellow-poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					Northern red oak	75	57	
					White oak-------	76	54	
					White ash-------	---	---	
					Pignut hickory--	---	---	
					American beech--	---	---	
					Sweet birch-----	---	---	
					Sugar maple-----	---	---	
Bledsoe-----	Severe	Severe	Slight	Severe	Yellow-poplar---	104	114	Yellow-poplar, white ash, white oak, northern red oak, eastern white pine.
					Black walnut----	---	---	
					White ash-------	---	---	
					Slippery elm----	---	---	
					Sugar maple-----	---	---	
					Black cherry----	---	---	
					American beech--	---	---	
					Pignut hickory--	74	---	
CgF**:								
Cloverlick--	Severe	Severe	Slight	Severe	Northern red oak	85	67	Yellow-poplar, white ash, northern red oak, shortleaf pine, eastern white pine.
					Sugar maple-----	---	---	
					Yellow-poplar---	110	124	
					American basswood-------	---	---	
					Black locust----	---	---	
					Yellow buckeye--	---	---	
Guyandotte--	Severe	Severe	Slight	Severe	Northern red oak	85	72	Black walnut, black cherry, eastern white pine, northern red oak, white ash.
					American basswood-------	99	57	
					Yellow-poplar---	104	114	
					Black cherry----	86	57	
					Black locust----	85	---	
Highsplint--	Moderate	Severe	Moderate	Moderate	Yellow-poplar---	100	107	Yellow-poplar, eastern white pine, shortleaf pine, northern red oak.
					White oak-------	---	--	
					Sugar maple-----	---	--	
					Northern red oak	87	72	
CkF**:								
Cloverlick--	Severe	Severe	Slight	Severe	Northern red oak	85	67	Yellow-poplar, eastern white pine, northern red oak, white oak, white ash, black walnut.
					Sugar maple-----	---	---	
					Yellow-poplar---	110	124	
					American basswood-------	---	---	
					Black locust----	---	---	
					Yellow buckeye--	---	---	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
CkF**:								
Kimper------	Severe	Severe	Slight	Severe	White oak-------	76	54	Yellow-poplar, white ash, northern red oak, white oak, eastern white pine,oak, black walnut.
					Yellow-poplar---	112	114	
					Sugar maple-----	---	---	
					American basswood-------	---	---	
					American beech--	---	---	
					Northern red oak	75	57	
Highsplint--	Severe	Severe	Slight	Moderate	Yellow-poplar---	100	90	Yellow-poplar, eastern white pine, shortleaf pine, northern red oak.
					White oak-------	---	---	
					Sugar maple-----	---	---	
					Northern red oak	87	71	
CsF**:								
Cloverlick--	Severe	Severe	Slight	Severe	Northern red oak	85	67	Yellow-poplar, white ash, northern red oak, shortleaf pine, eastern white pine.
					Sugar maple-----	---	---	
					Yellow-poplar---	110	124	
					American beech--	---	---	
Shelocta----	Severe	Severe	Slight	Severe	White oak-------	77	61	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar---	99	110	
					Cucumbertree----	---	---	
					Shortleaf pine--	77	---	
					Red maple-------	81	---	
					Scarlet oak-----	80	57	
					Northern red oak	65	50	
Kimper------	Severe	Severe	Slight	Severe	White oak-------	76	54	Yellow-poplar, white ash, northern red oak, white oak, eastern white pine, black walnut.
					Yellow-poplar---	112	114	
					Sugar maple-----	---	---	
					American basswood-------	---	---	
					American beech--	---	---	
					Sweet birch-----	---	---	
					Northern red oak	75	57	
DAM. Dam								
DgF**:								
Dekalb------	Severe	Severe	Severa	Moderate	Chestnut oak----	59	42	Eastern white pine, shortleaf pine, black oak.
					Black oak-------	67	49	
					Scarlet oak-----	---	---	
					Pitch pine------	---	---	
Gilpin------	Severe	Severe	Moderate	Moderate	Black oak-------	70	52	Eastern white pine, shortleaf pine, black oak.
					Scarlet oak-----	72	54	
					Chestnut oak----	68	50	
					Pignut hickory--	---	---	
Marrowbone--	Severe	Severe	Moderate	Moderate	Black oak-------	---	---	Black oak, northern red eastern white pine, shortleaf pine.
					Chestnut oak----	---	---	
					Pignut hickory--	---	---	
					Shortleaf pine--	75	120	
					Pitch pine------	---	---	
					Scarlet oak-----	---	---	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
DrF**:								
Dekalb	Severe	Severe	Severe	Moderate	Chestnut oak	59	42	Eastern white pine, shortleaf pine, black oak.
					Black oak	67	49	
					Scarlet oak	---	---	
					Pitch pine	---	---	
Gilpin	Severe	Severe	Moderate	Moderate	Black oak	70	52	Eastern white pine, shortleaf pine, black oak.
					Scarlet oak	72	54	
					Chestnut oak	68	50	
					Pignut hickory	---	---	
Rayne	Moderate	Severe	Slight	Severe	Northern red oak	80	62	Eastern white pine, black cherry, shortleaf pine, black oak.
					Yellow-poplar	90	90	
					Eastern white pine	90	---	
					Virginia pine	75	---	
					Shortleaf pine	75	114	
					Pitch pine	---	---	
FaF**:								
Fedscreek	Severe	Severe	Moderate	Severe	Scarlet oak	65	47	Shortleaf pine, white oak, black oak, eastern white pine.
					White oak	62	45	
					Black oak	66	48	
					American beech	---	---	
					Pignut hickory	---	---	
					Yellow-poplar	---	---	
					Virginia pine	---	---	
					Sugar maple	---	---	
Shelocta	Severe	Severe	Moderate	Severe	White oak	65	47	Shortleaf pine, black oak, white oak, eastern white pine.
					Yellow-poplar	90	93	
					American beech	---	---	
					Shortleaf pine	77	129	
					Red maple	81	---	
					Scarlet oak	70	---	
					Black oak	79	57	
Handshoe	Severe	Severe	Severe	Moderate	White oak	72	54	Shortleaf pine, eastern white pine, white oak, black oak.
					Yellow-poplar	---	---	
					Black oak	76	58	
					Scarlet oak	76	58	
FkE**:								
Fiveblock	Moderate	Severe	Severe	Moderate	Eastern white pine	94	---	Eastern white loblolly pine, Virginia pine, black locust.
					Loblolly pine	69	101	
					Red maple	---	---	
					American sycamore	90	---	
					Black locust	---	---	
Kaymine	Moderate	Moderate	Severe	Moderate	Loblolly pine	82	114	Eastern white loblolly pine, Virginia pine, black locust.
					Eastern white pine	94	72	
					Red maple	---	---	
					American sycamore	90	---	
					Black locust	---	---	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
GlD**:								
Gilpin	Severe	Severe	Moderate	Slight	White oak	61	44	Shortleaf pine, white oak, eastern white pine, northern red oak.
					Black oak	74	56	
					Scarlet oak	72	54	
					Chestnut oak	68	50	
					Shortleaf pine	60	88	
Shelocta	Moderate	Moderate	Moderate	Moderate	White oak	77	61	Black walnut, eastern white pine, shortleaf pine, white oak, northern red oak.
					Yellow-poplar	99	105	
					American beech	---	---	
					Shortleaf pine	77	129	
					Red maple	81	---	
					Scarlet oak	80	---	
					Black oak	70	56	
					Chestnut oak	68	50	
GmF**:								
Gilpin	Severe	Severe	Moderate	Severe	White oak	75	57	Shortleaf pine, eastern white pine, Virginia pine, black cherry, black walnut, white oak.
					Yellow-poplar	90	90	
					Chestnut oak	80	62	
					Scarlet oak	76	58	
					Black oak	80	62	
					Black cherry	---	---	
					Black locust	---	---	
Summers	Slight	Moderate	Severe	Severe	Northern red oak	70	57	Eastern white pine, Virginia pine, black cherry, black walnlut.
					Black cherry	70	43	
					Yellow-poplar	---	---	
					American basswood	---	---	
					Black locust	---	---	
Kimper	Severe	Moderate	Severe	Severe	White oak	76	54	Shortleaf pine, northern red oak, white oak, eastern white pine, black cherry, black walnut.
					Yellow-poplar	112	114	
					Sugar maple	---	---	
					American basswood	---	---	
					American beech	---	---	
					Northern red oak	75	57	
					Black cherry	---	---	
Gr: Grigsby	Slight	Slight	Slight	Severe	Yellow-poplar	110	124	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak	85	67	
					White oak	85	67	
					Black walnut	---	---	
					American sycamore	---	---	
					Sweetgum	---	---	
					Red maple	---	---	
					Hickory	---	---	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
GuB**:								
Grigsby-----	Slight	Slight	Slight	Severe	Yellow-poplar---	110	124	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak	85	67	
					White oak-------	85	67	
					Black walnut----	---	---	
					American sycamore-------	---	---	
					Sweetgum--------	---	---	
					Red maple-------	---	---	
					Hickory---------	---	---	
Urban land.								
HaF**:								
Handshoe----	Severe	Severe	Severe	Moderate	Black oak-------	76	58	Northern red oak, white oak, eastern white pine, shortleaf pine.
					White oak-------	72	54	
					Scarlet oak-----	76	58	
					Northern red oak	---	---	
					Chestnut oak----	---	---	
Fedscreek---	Severe	Severe	Moderate	Severe	Scarlet oak-----	65	47	Northern red oak, white oak, eastern white pine, shortleaf pine.
					Northern red oak	---	---	
					Yellow-poplar---	---	---	
					White oak-------	62	45	
					Black oak-------	66	48	
					Black locust----	---	---	
					Blackgum--------	---	---	
Marrowbone--	Severe	Severe	Slight	Moderate	Yellow-poplar---	95	98	Norther red oak, white oak, eastern white pine, shortleaf pine.
					Scarlet oak-----	65	47	
					American beech--	---	---	
					Northern red oak	---	---	
					Chestnut oak----	---	---	
					Blackgum--------	---	---	
					Red maple-------	---	---	
HeF**:								
Helechawa---	Moderate	Severe	Moderate	Moderate	White oak-------	65	47	Eastern white pine, shortleaf pine, white oak.
					Chestnut oak----	65	47	
					Scarlet oak-----	70	52	
					Virginia pine---	65	100	
Varilla-----	Moderate	Severe	Severe	Moderate	White oak-------	65	47	Eastern white pine, shortleaf pine, white oak.
					Virginia pine---	---	---	
					Red maple-------	---	---	
					Scarlet oak-----	70	52	
Jefferson---	Severe	Severe	Moderate	Moderate	Virginia pine---	70	100	Eastern white pine, shortleaf pine, white oak.
					Black oak-------	---	---	
					Shortleaf pine--	65	99	
					White oak-------	70	52	
					Pitch pine------	---	---	
					Chestnut oak----	63	46	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
HsF**:								
Highsplint--	Severe	Severe	Moderate	Moderate	Yellow-poplar---	90	90	White oak, shortleaf pine, eastern white pine.
					Northern red oak	---	---	
					Sugar maple-----	---	---	
					Chestnut oak----	---	---	
					White oak-------	---	---	
					American beech--	---	---	
					Red maple-------	---	---	
Shelocta----	Severe	Severe	Moderate	Severe	White oak-------	65	47	Eastern white pine, shortleaf pine, white oak.
					Yellow-poplar---	92	93	
					American beech--	---	---	
					Shortleaf pine--	77	---	
					Red maple-------	81	---	
					Scarlet oak-----	80	---	
					Black oak-------	70	52	
					Chestnut oak----	---	---	
Dekalb------	Severe	Severe	Severe	Moderate	Black oak-------	62	45	Eastern white pine, shortleaf pine, white oak.
					White oak-------	62	45	
					Scarlet oak-----	67	49	
					Chestnut oak----	59	42	
					Red maple-------	---	---	
HtF**:								
Highsplint--	Severe	Severe	Moderate	Moderate	Yellow-poplar---	100	107	Shortleaf pine, white oak, eastern white pine, yellow-poplar, northern red oak.
					Northern red oak	---	---	
					Sugar maple-----	---	---	
					Chestnut oak----	---	---	
					American basswood-------	---	---	
					Black cherry----	---	---	
Shelocta----	Severe	Severe	Slight	Severe	White oak-------	72	54	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar---	102	110	
					Cucumbertree----	---	---	
					American beech--	---	---	
					Shortleaf pine--	77	124	
					Red maple-------	81	---	
					American basswood-------	---	---	
					Northern red oak	---	---	
Muse--------	Severe	Severe	Slight	Severe	Shortleaf pine--	81	132	Shortleaf pine, white oak, eastern white pine, yellow-poplar, northern red oak.
					Virginia pine---	64	98	
					White oak-------	59	43	
					Red maple-------	---	---	
					Yellow-poplar---	110	124	
					Black oak-------	56	41	
					Chestnut oak----	62	45	
					American basswood-------	---	---	
Hy----------- Holly	Slight	Severe	Moderate	Severe	Black willow----	---	---	Eastern white pine, American sycamore, cherrybark oak, green ash, pin oak, sweetgum.
					Boxelder--------	---	---	
					Green ash-------	---	---	
					Pin oak---------	105	104	
					Red maple-------	---	---	
					Sweetgum--------	95	122	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
ImF----------Itmann	Severe	Severe	Severe	Slight	Black locust----	---	---	Black locust, black oak, red maple, eastern white pine, shortleaf pine.
					Red maple-------	---	---	
					Eastern white pine-----------	---	---	
					Virginia pine---	---	---	
					Shortleaf pine--	---	---	
					Sweet birch-----	---	---	
KfF**:								
Kaymine-----	Severe	Severe	Severe	Moderate	Eastern white pine-----------	94	76	Eastern white pine, Virginia pine, black locust, red mape, shortleaf pine.
					Loblolly pine---	82	114	
					American sycamore-------	90	---	
					Black locust----	---	---	
Fairpoint---	Severe	Severe	Moderate	Moderate	Yellow-poplar---	85	81	Eastern white pine, black locust, Virginia pine, Scotch pine, shortleaf pine.
					Black locust----	59	---	
					Red maple-------	---	---	
					Loblolly pine---	82	114	
					Eastern white pine-----------	85	155	
Fiveblock---	Severe	Severe	Severe	Moderate	Eastern white pine-----------	94	172	Eastern white pine, Virginia pine, shortleaf pine, black locust.
					Loblolly pine---	69	101	
					American sycamore-------	90	---	
					Black locust----	---	---	
KrF**:								
Kimper------	Severe	Severe	Slight	Severe	White oak-------	76	54	White ash, northern red oak, white oak, eastern white pine, black walnut.
					Yellow-poplar---	112	124	
					Sugar maple-----	---	---	
					American basswood-------	---	---	
					American beech--	---	---	
					Sweet birch-----	---	---	
					Northern red oak	75	57	
					Black walnut----	---	---	
Cloverlick--	Moderate	Moderate	Slight	Severe	Yellow-poplar---	110	114	Northern red oak, white oak, white ash, black walnut, eastern white pine.
					Northern red oak	85	67	
					White oak-------	76	54	
					White ash-------	---	---	
					Black walnut----	---	---	
					American beech--	---	---	
					Sugar maple-----	---	---	
					American basswood-------	---	---	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume*	
KrF**:								
Renox-------	Moderate	Severe	Slight	Severe	Yellow-poplar---	94	100	Northern red oak, white oak, white ash, black walnut, eastern white pine.
					Northern red oak	75	54	
					White oak-------	76	57	
					White ash-------	---	--	
					Black walnut----	---	--	
					American beech--	---	--	
					Sugar maple-----	---	--	
					Red maple-------	---	--	
RgB**:								
Rowdy-------	Slight	Slight	Slight	Severe	Yellow-poplar---	100	107	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					American sycamore-------	---	---	
					Black walnut----	---	---	
					River birch-----	---	---	
					White oak-------	---	---	
					American elm----	---	---	
					Sweetgum--------	---	---	
					Boxelder--------	---	---	
Grigsby-----	Slight	Slight	Slight	Severe	Yellow-poplar---	110	124	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak	85	67	
					White oak-------	85	67	
					Black walnut----	---	---	
					American sycamore-------	---	---	
					Sweetgum--------	---	---	
					Red maple-------	---	---	
					Hickory---------	---	---	
ShF**:								
Shelocta----	Severe	Severe	Moderate	Severe	Black oak-------	70	52	Eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					White oak-------	65	47	
					Yellow-poplar---	99	95	
					Shortleaf pine--	77	129	
					Red maple-------	81	---	
					Scarlet oak-----	68	50	
					American beech--	---	---	
Highsplint--	Severe	Severe	Moderate	Moderate	Yellow-poplar---	90	90	Eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Chestnut oak----	---	---	
					American beech--	---	---	
					White oak-------	---	---	
					Black oak-------	---	---	
SmF**:								
Shelocta----	Moderate	Moderate	Slight	Severe	White oak-------	72	54	Eastern white pine, shortleaf pine, white ash, white oak, northern red oak, black walnut.
					Yellow-poplar---	102	110	
					Shortleaf pine--	77	124	
					Red maple-------	---	---	
					American beech--	---	---	
					Black oak-------	77	59	
					Northern red oak	---	---	
					Sugar maple-----	---	---	

See footnotes at end of table.

Table 7.—Woodland Management and Productivity—Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
SmF**:								
Muse	Moderate	Moderate	Slight	Severe	Shortleaf pine	81	132	Shortleaf pine, white oak, eastern white pine, northern red oak.
					Virginia pine	64	98	
					White oak	62	45	
					Yellow-poplar	110	124	
					Black oak	56	41	
					Red maple	---	---	
					Hickory	---	---	
					American beech	---	---	
UuB**:								
Urban land.								
Udorthents.								
Grigsby	Slight	Slight	Slight	Severe	Yellow-poplar	110	124	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak	85	67	
					White oak	85	67	
					Black walnut	---	---	
					American sycamore	---	---	
					Sweetgum	---	---	
					Red maple	---	---	
					Hickory	---	---	
VaF**:								
Varilla	Moderate	Severe	Severe	Moderate	White oak	75	57	Eastern white pine, white oak, black oak, shortleaf pine, Virginia pine.
					Yellow-poplar	95	98	
					Eastern hemlock	---	---	
					American beech	---	---	
Jefferson	Severe	Severe	Moderate	Moderate	Northern red oak	85	66	Eastern white pine, Virginia pine, shortleaf pine, white oak, black oak.
					Yellow-poplar	108	112	
					Shortleaf pine	---	---	
					White oak	---	---	
					Chestnut oak	82	64	
					Black oak	---	---	
					Scarlet oak	---	---	
Alticrest	Moderate	Moderate	Moderate	Moderate	Scarlet oak	60	43	Eastern white pine, Virginia pine, shortleaf pine, white oak, black oak.
					Virginia pine	60	91	
					Shortleaf pine	60	88	
					Chestnut oak	64	43	
					Black oak	69	57	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.—Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AlC:					
Allegheny	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
AtF:					
Alticrest	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Ramsey	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
Wallen	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope small stones
BcG:					
Berks	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope small stones
Caneyville	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope
CbF:					
Caneyville	Severe: slope too stony	Severe: slope	Severe: slope	Severe: erodes easily slope too stony	Severe: slope
Renox	Severe: slope too stony	Severe: slope	Severe: slope	Severe: slope too stony	Severe: slope
Bledsoe	Severe: slope too stony	Severe: slope	Severe: slope	Severe: erodes easily slope too stony	Severe: slope
CgF:					
Cloverlick	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: small stones slope
Guyandotte	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones
Highsplint	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope small stones
CkF:					
Cloverlick	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope

Table 8.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CkF:					
Kimper----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Highsplint-----	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
CsF:					
Cloverlick-----	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
Shelocta-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kimper----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
DAM. Dam					
DgF:					
Dekalb----------	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Marrowbone-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
DrF:					
Dekalb----------	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rayne-----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
FaF:					
Fedscreek------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shelocta-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Handshoe-------	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope small stones
FkE:					
Fiveblock------	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: slope droughty
Kaymine--------	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: slope

Table 8.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GlD:					
Gilpin---------	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Shelocta-------	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
GmF:					
Gilpin---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Summers--------	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones small stones	Severe: slope large stones	Severe: slope large stones
Kimper---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Gr:					
Grigsby--------	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
GuB:					
Grigsby--------	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
Urban land.					
HaF:					
Handshoe-------	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope small stones
Fedscreek------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Marrowbone-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HeF:					
Helechawa------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Varilla--------	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
Jefferson------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HsF:					
Highsplint-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones
Shelocta-------	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope

Table 8.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HsF:					
Dekalb	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
HtF:					
Highsplint	Severe: slope too stony	Severe: slope	Severe: slope small stones	Severe: slope too stony	Severe: slope
Shelocta	Severe: slope too stony	Severe: slope	Severe: slope small stony	Severe: slope too stony	Severe: slope
Muse	Severe: slope too stony	Severe: slope	Severe: slope	Severe: erodes easily slope too stony	Severe: slope
Hy:					
Holly	Severe: flooding wetness	Severe: wetness	Severe: wetness flooding	Severe: wetness	Severe: wetness flooding
ImF:					
Itmann	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones droughty
KfF:					
Kaymine	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
Fairpoint	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
Fiveblock	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope droughty
KrF:					
Kimper	Severe: slope too stony	Severe: slope	Severe: slope	Severe: slope too stony	Severe: slope
Cloverlick	Severe: slope too stony	Severe: slope	Severe: slope small stones	Severe: slope too stony	Severe: slope
Renox	Severe: slope too stony	Severe: slope	Severe: slope	Severe: slope too stony	Severe: slope
Pt.					
Pits, quarries					

Table 8.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RgB:					
Rowdy----------	Severe: flooding	Slight	Moderate: flooding slope	Slight	Moderate: flooding
Grigsby--------	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
ShF:					
Shelocta-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Highsplint-----	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
SmF:					
Shelocta-------	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
Muse-----------	Severe: slope	Severe: slope	Severe: slope small stones	Severe: erodes easily slope	Severe: slope
UdE. Udorthents-Urban land					
UrC. Urban land-Udorthents					
UuB:					
Urban land.					
Udorthents.					
Grigsby--------	Severe: flooding	Slight	Moderate: flooding	Slight	Slight
VaF:					
Varilla--------	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
Jefferson------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Alticrest------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
W. Water					

Table 9.—Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Potential for habitat elements							Potential as habitat for		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life
AlC:										
Allegheny	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
AtF:										
Alticrest	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Ramsey	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
Wallen	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
BcG:										
Berks	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
Caneyville	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
CbF:										
Caneyville	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Renox	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Bledsoe	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
CgF:										
Cloverlick	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Guyandotte	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Highsplint	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
CkF:										
Cloverlick	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Kimper	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Highsplint	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
CsF:										
Cloverlick	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor

Table 9.—Wildlife Habitat—Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for: Openland wildlife	Woodland wildlife	Wetland wildlife
CsF:										
Shelocta-------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Kimper---------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
DAM. Dam										
DgF:										
Dekalb---------	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Gilpin---------	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Marrowbone-----	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
DrF:										
Dekalb---------	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Gilpin---------	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rayne----------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
FaF:										
Fedscreek------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Shelocta-------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Handshoe-------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
FkE:										
Fiveblock------	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Kaymine--------	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
GlD:										
Gilpin---------	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Shelocta-------	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
GmF:										
Gilpin---------	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor

Table 9.—Wildlife Habitat—Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Potential as habitat for: Open-land wild-life	Wood-land wild-life	Wetland wild-life
GmF:										
Summers	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Kimper	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Gr:										
Grigsby	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
GuB:										
Grigsby	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Urban land.										
HaF:										
Handshoe	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Fedscreek	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Marrowbone	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
HeF:										
Helechawa	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Varilla	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Jefferson	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
HsF:										
Highsplint	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Shelocta	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Dekalb	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
HtF:										
Highsplint	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Shelocta	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Muse	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Hy:										
Holly	Fair	Fair	Poor	Fair	Fair	Good	Good	Fair	Fair	Good

Table 9.—Wildlife Habitat—Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life
ImF:										
Itmann	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
KfF:										
Kaymine	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Fairpoint	Very poor	Very poor	Poor	Poor	Poor	Very poor	Very poor	Very poor	Poor	Very poor
Fiveblock	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
KrF:										
Kimper	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Cloverlick	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Renox	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Pt. Pits, quarries										
RgB:										
Rowdy	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Grigsby	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
ShF:										
Shelocta	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Highsplint	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
SmF:										
Shelocta	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Muse	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
UdE. Udorthents-Urban land										
UrC. Urban land-Udorthents										

Table 9.—Wildlife Habitat—Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
UuB:										
Urban land.										
Udorthents.										
Grigsby--------	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
VaF:										
Varilla--------	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Jefferson------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Alticrest------	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
W.										
Water										

Table 10.–Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the ne investigation. See text for definitions of terms used in this table. Absence of an entry ir rating is applicable)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
AlC:					
Allegheny	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope
AtF:					
Alticrest	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope
Ramsey	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rocl
Wallen	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope
BcG:					
Berks	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope
Caneyville	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: low strength slope
CbF:					
Caneyville	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: low strength slope
Renox	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Bledsoe	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope
CgF:					
Cloverlick	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 10.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
CgF:					
Guyandotte--------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Highsplint--------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
CkF:					
Cloverlick--------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kimper------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Highsplint--------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
CsF:					
Cloverlick--------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shelocta----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kimper------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
DAM:					
Dam.					
DgF:					
Dekalb------------	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope
Gilpin------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Marrowbone--------	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope

Table 10.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
DrF:					
Dekalb-----------	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope
Gilpin-----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rayne------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
FaF:					
Fedscreek---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shelocta----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Handshoe----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
FkE:					
Fiveblock---------	Severe: large stones slope	Severe: slope unstable fill	Severe: slope unstable fill	Severe: large stones slope unstable fill	Severe: slope unstable fill
Kaymine-----------	Severe: large stones slope	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill
GlD:					
Gilpin------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shelocta----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
GmF:					
Gilpin------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Summers-----------	Severe: slope depth to rock	Severe: slope large stones	Severe: slope large stones depth to rock	Severe: slope large stones	Severe: slope large stones

Table 10.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
GmF:					
Kimper	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Gr:					
Grigsby	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
GuB:					
Grigsby	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
Urban land.					
HaF:					
Handshoe	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Fedscreek	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Marrowbone	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope
HeF:					
Helechawa	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Varilla	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Jefferson	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HsF:					
Highsplint	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 10.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
HsF:					
Shelocta----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Dekalb------------	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope
HtF:					
Highsplint--------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shelocta----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Muse--------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope
Hy:					
Holly-------------	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: wetness
ImF:					
Itmann------------	Severe: slope	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope
KfF:					
Kaymine-----------	Severe: slope	Severe: slope unstable fill	Severe: slope unstable fill large stones	Severe: slope unstable fill	Severe: slope unstable fill
Fairpoint---------	Severe: slope	Severe: slope unstable fill	Severe: slope unstable fill large stones	Severe: slope unstable fill	Severe: slope unstable fill
Fiveblock---------	Severe: slope	Severe: slope unstable fill	Severe: slope unstable fill large stones	Severe: slope unstable fill	Severe: slope unstable fill

Table 10.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
KrF:					
Kimper	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Cloverlick	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Renox	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Pt. Pits, quarries					
RgB:					
Rowdy	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
Grigsby	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
ShF:					
Shelocta	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Highsplint	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
SmF:					
Shelocta	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Muse	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope
UdE: Udorthents-Urban land					
UrC. Urban land-Udorthents					

Table 10.–Building Site Development–Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
UuB:					
Urban land.					
Udorthents.					
Grigsby----------	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
VaF:					
Varilla----------	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Jefferson--------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Alticrest--------	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope
W.					
Water					

Table 11.—Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AlC:					
Allegheny	Moderate: slope	Severe slope	Moderate: slope	Moderate: slope	Fair: slope
AtF:					
Alticrest	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
Ramsey	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope thin layer depth to rock
Wallen	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock large stones	Severe: seepage slope depth to rock	Poor: slope small stones depth to rock large stones
BcG:					
Berks	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope small stones depth to rock
Caneyville	Severe: percs slowly slope depth to rock	Severe: slope depth to rock	Severe: slope too clayey depth to rock	Severe: slope depth to rock	Poor: slope too clayey depth to rock hard to pack
CbF:					
Caneyville	Severe: percs slowly slope depth to rock	Severe: slope depth to rock	Severe: slope too clayey depth to rock	Severe: slope depth to rock	Poor: slope hard to pack too clayey depth to rock
Renox	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Bledsoe	Severe: percs slowly slope	Severe: slope	Severe: slope too clayey	Severe: slope	Poor: slope too clayey hard to pack
CgF:					
Cloverlick	Severe: slope	Severe: slope	Severe: slope	Severe: seepage slope	Poor: slope small stones
Guyandotte	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope small stones

Table 11.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CgF:					
Highsplint	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: slope small stones
CkF:					
Cloverlick	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope small stones
Kimper	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Highsplint	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope small stones
CsF:					
Cloverlick	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope small stones
Shelocta	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: slope
Kimper	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
DAM. Dam					
DgF:					
Dekalb	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope small stones depth to rock
Gilpin	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
Marrowbone	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
DrF:					
Dekalb	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope small stones depth to rock
Gilpin	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
Rayne	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: slope

Table 11.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FaF:					
Fedscreek	Severe: slope	Severe: seepage slope	Severe: seepage slope depth to rock	Severe: seepage slope	Poor: slope
Shelocta	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: slope
Handshoe	Severe: slope poor filter	Severe: large stones seepage slope	Severe: seepage slope large stones	Severe: seepage slope	Poor: slope small stones
FkE:					
Fiveblock	Severe: slope unstable fill poor filter	Severe: slope unstable fill seepage	Severe: slope unstable fill seepage	Severe: slope unstable fill seepage	Poor: small stones slope
Kaymine	Severe: slope unstable fill	Severe: seepage slope unstable fill	Severe: seepage slope unstable fill	Severe: seepage slope unstable fill	Poor: small stones slope
GlD:					
Gilpin	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
Shelocta	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: slope
GmF:					
Gilpin	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
Summers	Severe: slope large stones depth to rock	Severe: slope large stones depth to rock seepage	Severe: depth to rock slope seepage large stones	Severe: slope seepage depth to rock	Poor: slope depth to rock large stones
Kimper	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Gr:					
Grigsby	Severe: flooding wetness	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding seepage	Good
GuB:					
Grigsby	Severe: flooding wetness	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding seepage	Good

Table 11.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GuB:					
Urban land.					
HaF:					
Handshoe-------	Severe: slope poor filter	Severe: large stones seepage slope	Severe: seepage slope large stones	Severe: seepage slope	Poor: slope small stones
Fedscreek------	Severe: slope	Severe: seepage slope	Severe: seepage slope depth to rock	Severe: seepage slope	Poor: slope
Marrowbone-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: depth to rock slope
HeF:					
Helechawa------	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope depth to rock	Severe: seepage slope	Severe: slope
Varilla--------	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope large stones	Severe: seepage slope	Severe: slope small stones
Jefferson------	Severe: slope	Severe: seepage slope	Severe: slope depth to rock	Severe: slope	Severe: slope
HsF:					
Highsplint-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones slope
Shelocta-------	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: slope
Dekalb---------	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope small stones depth to rock
HtF:					
Highsplint-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope small stones
Shelocta-------	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: slope

Table 11.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HtF:					
Muse----------	Severe: percs slowly slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: hard to pack slope too clayey
Hy:					
Holly----------	Severe: wetness flooding	Severe: seepage wetness flooding	Severe: seepage wetness flooding	Severe: seepage wetness	Poor: wetness
ImF:					
Itmann---------	Severe: slope poor filter unstable fill	Severe: slope seepage unstable fill	Severe: slope seepage unstable fill	Severe: slope seepage unstable fill	Severe: slope small stones
KfF:					
Kaymine--------	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Poor: slope small stones
Fairpoint------	Severe: percs slowly slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope small stones
Fiveblock------	Severe: slope unstable fill poor filter	Severe: slope unstable fill seepage	Severe: slope unstable fill seepage	Severe: slope unstable fill seepage	Poor: slope small stones
KrF:					
Kimper---------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Cloverlick-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope small stones
Renox----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Pt.					
Pits, quarries					
RgB:					
Rowdy----------	Moderate: flooding	Severe: flooding seepage	Moderate: flooding seepage	Severe: flooding	Good
Grigsby--------	Severe: flooding poor filter wetness	Severe: flooding seepage wetness	Severe: flooding seepage	Severe: flooding seepage	Good

Table 11.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ShF:					
Shelocta-------	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: slope
Highsplint-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope small stones
SmF:					
Shelocta-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: small stones slope
Muse-----------	Severe: percs slowly slope	Severe: slope	Severe: slope depth to rock	Severe: slope	Poor: hard to pack slope too clayey
UdE. Udorthents-Urban land					
UrC. Urban land-Udorthents					
UuB: Urban land.					
Udorthents.					
Grigsby--------	Moderate: flooding wetness poor filter	Severe: seepage	Severe: seepage wetness	Severe: seepage	Good
VaF:					
Varilla--------	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope large stones	Severe: seepage slope	Poor: slope small stones
Jefferson------	Severe: slope	Severe: slope	Severe: slope depth to rock	Severe: slope seepage	Poor: slope
Alticrest------	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
W. Water					

Table 12.—Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AlC:				
Allegheny	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope area reclaim
AtF:				
Alticrest	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope
Ramsey	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones depth to rock
Wallen	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
BcG:				
Berks	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Caneyville	Poor: low strength slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
CbF:				
Caneyville	Poor: low strength slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey too stony
Renox	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too stony
Bledsoe	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim too clayey too stony
CgF:				
Cloverlick	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Guyandotte	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim

Table 12.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
CgF:				
Highsplint	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
CkF:				
Cloverlick	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Kimper	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Highsplint	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
CsF:				
Cloverlick	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Shelocta	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Kimper	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope area reclaim small stones
DAM. Dam				
DgF:				
Dekalb	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Gilpin	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Marrowbone	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope
DrF:				
Dekalb	Poor: slope depth to rock	Improbable: thin layer excess fines	Improbable: thin layer excess fines	Poor: slope small stones
Gilpin	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones

Table 12.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
DrF:				
Rayne	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope area reclaim
FaF:				
Fedscreek	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Shelocta	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Handshoe	Poor: large stones slope	Improbable: large stones excess fines	Improbable: large stones excess fines	Poor: slope small stones area reclaim
FkE:				
Fiveblock	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Kaymine	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
GlD:				
Gilpin	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Shelocta	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
GmF:				
Gilpin	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Summers	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope large stones
Kimper	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Gr:				
Grigsby	Good	Improbable: excess fines	Improbable: excess fines	Good

Table 12.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
GuB:				
Grigsby------------	Good	Improbable: excess fines	Improbable: excess fines	Good
Urban land.				
HaF:				
Handshoe-----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Fedscreek----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Marrowbone---------	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope
HeF:				
Helechawa----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
Varilla------------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope large stones
Jefferson----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
HsF:				
Highsplint---------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Shelocta-----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Dekalb-------------	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones slope
HtF:				
Highsplint---------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope too stony
Shelocta-----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope too stony

Table 12.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
HtF:				
Muse	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey too stony
Hy:				
Holly	Poor: wetness	Improbable excess fines	Improbable excess fines	Poor: wetness
ImF:				
Itmann	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
KfF:				
Kaymine	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
Fairpoint	Poor: slope low strength	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
Fiveblock	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones area reclaim
KrF:				
Kimper	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope too stony
Cloverlick	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope too stony
Renox	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope too stony
Pt. Pits, quarries				
RgB:				
Rowdy	Good	Improbable: excess fines	Improbable: excess fines	Good
Grigsby	Good	Improbable: excess fines	Improbable: excess fines	Good

Table 12.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
ShF:				
Shelocta	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
Highsplint	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
SmF:				
Shelocta	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
Muse	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
UdE. Udorthents-Urban land				
UrC. Urban land-Udorthents				
UuB:				
Urban land.				
Udorthents.				
Grigsby	Good	Improbable: excess fines	Improbable: excess fines	Good
VaF:				
Varilla	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones slope
Jefferson	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Alticrest	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope
W. Water				

Table 13.—Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text f "slight," "moderate," and "severe." Absence of an entry indicates that the soil was no information in this table indicates the dominant soil condition but does not eliminate onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting Drainage	Features affecting Terraces and diversions
AlC: Allegheny	Moderate: slope	Severe: piping	Deep to water	Slope
AtF*: Alticrest	Severe: seepage slope	Severe: seepage piping	Deep to water	Slope too sandy depth to rock
Ramsey	Severe: depth to rock slope	Severe: piping	Deep to water	Slope too sandy depth to rock
Wallen	Severe: seepage slope	Severe: seepage large stones	Deep to water	Slope large stones depth to rock
BcG*: Berks	Severe: seepage slope	Severe: seepage	Deep to water	Slope large stones depth to rock
Caneyville	Severe: slope	Severe: thin layer hard to pack	Deep to water	Slope depth to rock erodes easily
CbF*: Caneyville	Severe: slope	Severe: thin layer hard to pack	Deep to water	Slope erodes easily depth to rock
Renox	Severe: slope	Moderate: piping	Deep to water	Slope
Bledsoe	Severe: slope	Moderate: hard to pack	Deep to water	Slope erodes easily percs slowly
CgF*: Cloverlick	Severe: slope	Severe: piping	Deep to water	Slope large stones

See footnote at end of table.

Table 13.-Water Management-Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions
CgF*:				
Guyandotte-------	Severe: slope	Severe: piping	Deep to water	Slope large stones
Highsplint-------	Severe: slope	Severe: piping	Deep to water	Slope large stones
CkF*:				
Cloverlick-------	Severe: slope	Severe: piping	Deep to water	Slope large stones
Kimper-----------	Severe: slope	Severe: piping	Deep to water	Slope large stones
Highsplint-------	Severe: slope	Severe: piping	Deep to water	Slope large stones
CsF*:				
Cloverlick-------	Severe: slope	Severe: piping	Deep to water	Slope large stones
Shelocta---------	Severe: slope	Moderate: piping	Deep to water	Slope
Kimper-----------	Severe: slope	Mode4ate: piping.	Deep to water	Slope large stones
DAM*. Dam				
DgF*:				
Dekalb-----------	Severe: seepage slope	Severe: large stones piping	Deep to water	Slope large stones depth to rock
Gilpin-----------	Severe: slope	Moderate: piping	Deep to water	Slope depth to rock
Marrowbone-------	Severe: seepage slope	Severe: piping	Deep to water	Slope depth to rock

See footnote at end of table.

Table 13.—Water Management—Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions
DrF*:				
Dekalb----------	Severe: seepage slope	Severe: piping large stones	Deep to water	Slope large stones depth to rock
Gilpin----------	Severe: slope	Moderate: piping	Deep to water	Slope large stones depth to rock
Rayne-----------	Severe: slope	Moderate: piping	Deep to water	Slope
FaF*:				
Fedscreek--------	Severe: seepage slope	Severe: piping	Deep to water	Slope
Shelocta---------	Severe: slope	Moderate: piping	Deep to water	Slope
Handshoe---------	Severe: seepage slope	Severe: seepage large stones	Deep to water	Slope large stones
FkE*:				
Fiveblock--------	Severe: seepage slope	Severe: seepage large stones	Deep to water	Slope large stones
Kaymine----------	Severe: slope	Moderate: large stones.	Deep to water	Slope large stones
GlD:				
Gilpin----------	Severe: slope	Severe: piping	Deep to water	Slope large stones depth to rock
Shelocta---------	Severe: slope	Moderate: piping	Deep to water	Slope
GmF*:				
Gilpin----------	Severe: slope	Moderate: piping	Deep to water	Slope large stones depth to rock

See footnote at end of table.

Table 13.—Water Management—Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions
GmF*:				
Summers----------	Severe: seepage slope	Severe: piping large stones	Deep to water	Slope depth to rock large stones
Kimper-----------	Severe: slope	Moderate: piping	Deep to water	Slope large stones
Gr---------------- Grigsby	Severe: seepage	Severe: seepage piping	Deep to water	Favorable
GuB*:				
Grigsby----------	Severe: seepage	Severe: seepage piping	Deep to water	Favorable
Urban land.				
HaF*:				
Handshoe---------	Severe: seepage slope	Severe: seepage large stones	Deep to water	Slope large stones
Fedscreek--------	Severe: seepage slope	Severe: piping	Deep to water	Slope
Marrowbone-------	Severe: seepage slope	Severe: piping	Deep to water	Slope depth to rock
HeF*:				
Helechawa--------	Severe: slope	Severe: piping	Deep to water	Slope
Varilla----------	Severe: seepage slope	Severe: seepage large stones	Deep to water	Slope large stones
Jefferson--------	Severe: seepage slope	Severe: piping	Deep to water	Slope

See footnote at end of table.

Table 13.—Water Management—Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Terraces and diversions
HsF*:				
Highsplint-------	Severe: slope	Severe: piping	Deep to water	Slope large stones
Shelocta---------	Severe: slope	Moderate: piping	Deep to water	Slope
Dekalb-----------	Severe: seepage slope	Severe: large stones piping thin layer	Deep to water	Slope large stones depth to rock
HtF*:				
Highsplint-------	Severe: slope	Severe: piping	Deep to water	Slope large stones
Shelocta---------	Severe: slope	Severe: piping.	Deep to water	Slope
Muse-------------	Severe: slope	Moderate: hard to pack	Deep to water	Slope erodes easily percs slowly
Hy--------------- Holly	Severe: seepage	Severe: piping wetness	Flooding	Wetness
ImF-------------- Itmann	Severe: seepage slope	Severe: seepage	Deep to water	Slope
KfF*:				
Kaymine----------	Severe: seepage slope	Moderate: large stones	Deep to water	Slope large stones
Fairpoint--------	Severe: slope	Severe: piping	Deep to water	Slope large stones slippage
Fiveblock--------	Severe: seepage slope	Severe: seepage	Deep to water	Slope large stones

See footnote at end of table.

Table 13.—Water Management—Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions
KrF*:				
Kimper	Severe: slope	Severe: piping	Deep to water	Slope large stones
Cloverlick	Severe: slope	Severe: piping	Deep to water	Slope large stones
Renox	Severe: slope	Moderate: piping	Deep to water	Slope large stone
Pt*. Pits, quarries				
RgB*:				
Rowdy	Moderate: seepage	Moderate: piping	Deep to water	Favorable
Grigsby	Severe: seepage	Severe: seepage piping	Deep to water	Favorable
ShF*:				
Shelocta	Severe: slope	Severe: piping	Deep to water	Slope
Highsplint	Severe: slope	Severe: piping	Deep to water	Slope large stones
SmF*:				
Shelocta	Severe: seepage slope	Severe: piping	Deep to water	Slope
Muse	Severe: slope	Moderate: hard to pack thin layer	Deep to water	Slope erodes easily percs slowly
UdF*. Udorthents-Urban land				
UrD*. Urban land-Udorthents				

See footnote at end of table.

Table 13.-Water Management-Continued

Soil name and map symbol	Limitations for--		Features affecting	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions
UuB*:				
Urban land.				
Udorthents.				
Grigsby----------	Severe: seepage	Severe: seepage piping	Deep to water	Favorable
VaF*:				
Varilla----------	Severe: seepage slope	Severe: seepage large stones	Deep to water	Slope large stones
Jefferson--------	Severe: slope	Severe: piping	Deep to water	Slope
Alticrest--------	Severe: seepage slope	Severe: seepage piping	Deep to water	Slope depth to rock
W*.				
Water				

* See description of the map unit for composition and behavior characteristics of the ma

Table 14.—Engineering Index Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	2
	In				Pct	Pct				
AlC:										
Allegheny-----	0-7	Loam	CL, ML	A-4	0	0	95-100	80-100	65-100	55
	7-72	Loam, silt loam, fine sandy loam	CL, ML, SM, SC	A-4, A-6	0	0	90-100	80-100	65-95	35
	72-80	Clay loam, loam, sandy loam, sandy clay loam	CL, SC, SM, ML	A-1, A-6, A-2, A-4	---	0-5	65-100	55-100	35-95	20
AtF:										
Alticrest-----	0-3	Sandy loam	SM, SC-SM,	A-2, A-4	0	0-5	80-100	75-100	55-80	25
	3-25	Sandy loam, loam, channery sandy loam	ML, SC-SM, CL-ML, SM	A-2, A-4	0	0-5	80-100	75-100	55-85	25
	25-30	Weathered bedrock			---	---	---	---	---	-
	30-34	Unweathered bedrock			---	---	---	---	---	-
Ramsey--------	0-1	Sandy loam	SP-SM, SM, SC-SM	A-2, A-4	---	0-10	85-100	75-95	60-75	30
	1-17	Loam, sandy loam, channery sandy loam	SM, SP-SM, SC-SM	A-2, A-4	---	5-25	80-100	60-90	50-75	30
	17-21	Unweathered bedrock			---	---	---	---	---	-
Wallen--------	0-2	Channery sandy loam	SC-SM, SM	A-1, A-4, A-2	0-5	5-15	70-85	60-80	40-60	20
	2-24	Very channery loam, very channery sandy loam, extremely channery sandy loam	GC-GM, GM, SM, SC-SM	A-1, A-2, A-4	0-10	10-20	35-65	30-60	20-50	10
	24-28	Unweathered bedrock			---	---	---	---	---	-

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
BcG:										
Berks----------	0-3	Channery silt loam	GM, ML, GC, SC	A-2, A-4	0	0-30	50-80	45-70	40-60	30
	3-17	Channery loam, very channery silt loam, channery silt loam	GM, SC, GC, SM	A-1, A-4, A-2	0	0-30	40-80	35-70	25-60	20
	17-27	Channery loam, very channery silt loam, channery silt loam	GM, SM	A-1, A-2	0	0-40	35-65	25-55	20-40	15
	27-31	Unweathered bedrock			---	---	---	---	---	-
Caneyville----	0-5	Silt loam	CL-ML, CL, ML	A-4, A-6	---	0-3	90-100	85-100	75-100	60
	5-22	Silty clay, clay, silty clay loam	CH, CL	A-7	---	0-3	90-100	85-100	75-100	65
	22-26	Unweathered bedrock			---	---	---	---	---	-
CbF:										
Caneyville----	0-8	Silty clay loam	CL	A-6, A-4	---	0-3	90-100	85-100	75-100	65
	8-36	Silty clay, clay, silty clay loam	CH, CL	A-7	---	0-3	90-100	85-100	75-100	65
	36-40	Unweathered bedrock			---	---	---	---	---	-
Renox----------	0-5	Silt loam	CL, CL-ML, ML	A-4	0-2	0-3	90-100	85-95	80-90	70
	5-30	Channery silt loam, silt loam, channery loam, loam	CL, GM, SC, ML	A-2, A-6, A-4	0-2	0-3	65-95	50-90	40-80	30
	30-80	Silty clay loam, channery silty clay loam, very channery silty clay loam	GM, GC, ML, SC	A-2, A-4, A-6	0-5	0-5	55-90	45-85	35-75	30

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
CbF:										
Bledsoe-------	0-12	Silt loam	CL, CL-ML	A-4, A-6	---	0-5	85-95	80-95	70-90	50
	12-43	Silty clay, channery silty clay, silty clay loam, channery silty clay loam	CH, CL	A-6, A-7	---	0-15	65-95	65-95	60-90	50
	43-80	Clay, flaggy clay, very flaggy clay	CH, SC, CL, GC	A-6, A-7	0-35	0-40	50-100	50-100	40-90	35
CgF:										
Cloverlick----	0-6	Gravelly loam	CL-ML, CL, SC, SC-SM	A-6, A-4, A-7	---	5-10	50-90	40-85	40-80	35
	6-22	Gravelly loam, gravelly silt loam, flaggy loam	ML, CL-ML, SC-SM, SM	A-4, A-6, A-7	---	5-20	50-90	40-85	40-85	35
	22-41	Very gravelly loam, very gravelly silt loam, very flaggy loam	ML, CL-ML, SC-SM, SM	A-2, A-6, A-4	---	5-35	50-80	40-75	35-70	30
	41-70	Very flaggy loam, extremely flaggy loam, extremely flaggy silt loam	GC-GM, SM, GM, SC-SM	A-2, A-6, A-4	---	10-40	40-90	40-80	30-70	30
Guyandotte----	0-17	Very channery loam	CL-ML, SC-SM, GC-GM, ML	A-1, A-2, A-4	---	5-20	30-70	25-65	20-60	15
	17-80	Very channery loam, very channery sandy loam, extremely channery sandy loam	GC-GM, CL-ML, ML, SC-SM	A-1, A-4, A-2	---	5-35	25-65	20-60	15-55	10

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
CgF:										
Highsplint----	0-3	Very channery loam	GC-GM, CL-ML, ML, SC-SM	A-2, A-6, A-4	0-10	5-25	45-80	40-70	35-65	30
	3-28	Very channery silty clay loam, very channery loam, very channery silt loam	CL-ML, CL, GC, SC	A-4, A-7-6, A-6	0-10	5-25	45-75	40-70	40-70	35
	28-80	Very channery loam, very channery silty clay loam, very channery silt loam	CL, SC-SM, CL-ML, GC-GM	A-4, A-2, A-6, A-7-6	0-10	5-25	45-75	40-70	40-70	30
CkF:										
Cloverlick----	0-9	Channery loam	CL, SC-SM, CL-ML, SC	A-4, A-6, A-7	---	5-10	60-90	50-85	40-80	35
	9-35	Very channery loam, very channery silt loam, channery silt loam, channery loam	ML, CL-ML, SC-SM, SM	A-4, A-7, A-6	---	5-20	50-90	40-85	40-85	35
	35-80	Very channery loam, very flaggy loam, extremely channery loam, very channery silt loam	CL-ML, ML, SM, SC-SM	A-2, A-6, A-4	---	5-35	40-80	40-75	35-70	30

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
CkF:										
Kimper--------	0-6	Silt loam	CL-ML, ML, SM	A-4	---	0-5	90-100	90-100	30-70	20
	6-62	Silt loam, channery silt loam, channery loam, loam	CL, ML, CL-ML, GM	A-2-4, A-4	---	5-20	50-85	50-75	30-70	20
	62-80	Loam, channery loam, very channery loam, silt loam	CL-ML, CL, GM, ML	A-1-b, A-4, A-2-4	0-5	5-15	40-85	40-75	30-70	20
Highsplint----	0-9	Channery silt loam	GC-GM, CL-ML, ML, SC-SM	A-2, A-6, A-4	0-5	5-10	70-90	60-80	45-70	35
	9-55	Channery silt loam, very channery silt loam, very channery loam channery loam	CL-ML, CL, GC, SC	A-4, A-6, A-7-6	0-10	5-25	45-75	40-70	40-70	35
	55-80	Very channery silt loam, extremely channery silt loam, very channery loam, extremely channery loam	GC-GM, SC-SM, CL, CL-ML	A-2, A-4, A-6, A-7-6	0-10	5-25	45-75	40-70	40-70	30

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
CsF:										
Cloverlick----	0-9	Loam	CL, SC-SM, CL-ML, SC	A-4, A-6, A-7	---	5-10	60-90	50-85	40-80	35
	9-35	Channery loam, very channery loam, channery silt loam, very channery silt loam	ML, CL-ML, SC-SM, SM	A-4, A-7, A-6	---	5-20	50-90	40-85	40-85	35
	35-80	Very channery loam, very flaggy loam, extremely channery loam, very channery silt loam	CL-ML, SM, SC-SM, ML	A-2, A-4, A-6	---	5-35	40-80	40-75	35-70	30
Shelocta------	0-3	Silt loam	CL-ML, ML	A-4	---	0-5	80-95	75-95	60-95	55
	3-27	Silt loam, loam, channery silt loam, channery loam	CL-ML, CL, GC, SC	A-4, A-6	---	0-10	55-95	50-95	45-95	40
	27-56	Channery silt loam, very channery silt loam, channery loam, channery silty clay loam	GC, GM, CL, ML	A-1-b, A-2, A-6, A-4	0-10	0-15	40-85	35-70	25-70	20
	56-66	Weathered bedrock			---	---	---	---	---	-
Kimper--------	0-6	Silt loam	CL-ML, ML, SM	A-4	0	0-5	90-100	90-100	30-70	20
	6-62	Silt loam, channery silt loam, channery loam, loam	CL, CL-ML, ML, GM	A-2-4, A-4	0-5	5-20	50-85	50-75	30-70	20
	62-80	Loam, channery loam, very channery loam, silt loam	CL-ML, GM, CL, ML	A-1-b, A-2-4, A-4	0-10	5-15	40-85	40-75	30-70	20

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	2
	In				Pct	Pct				
DAM. Dam										
DgF: Dekalb--------	0-2	Channery sandy loam	SM, SC-SM	A-4	---	5-15	55-90	45-85	40-80	35
	2-25	Channery sandy loam, channery loam, very channery sandy loam, very channery loam	GM, GC-GM, SC-SM, SM	A-1, A-2, A-4	---	5-40	50-85	40-80	40-75	20
	25-29	Unweathered bedrock			---	---	---	---	---	-
Gilpin--------	0-2	Loam	CL, CL-ML	A-4, A-6	---	0-5	80-95	75-90	70-85	65
	2-28	Silt loam, loam, silty clay loam, channery silt loam	CL, CL-ML, SC, GC	A-2, A-4, A-6	---	0-20	50-95	45-90	35-85	30
	28-34	Very channery silt loam, very channery loam, very channery silty clay loam	GC, GC-GM	A-2, A-1, A-4, A-6	---	0-35	30-55	25-50	20-45	15
	34-44	Unweathered bedrock			---	---	---	---	---	-
Marrowbone----	0-2	Fine sandy loam	GM, SC, SM, SC-SM	A-4	---	0-5	80-95	75-82	45-80	20
	2-31	Sandy loam, loam, fine sandy loam, channery fine sandy loam	SC, SC-SM, GC-GM, SM	A-2-4, A-4	---	0-10	55-95	55-90	40-80	20
	31-37	Sandy loam, loam, fine sandy loam, channery sandy loam	SC, SC-SM, GC-GM, SM	A-2-4, A-4	---	0-15	50-95	50-90	40-85	25
	37-41	Unweathered bedrock			---	---	---	---	---	-

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
DrF:										
Dekalb--------	0-2	Channery sandy loam	SC-SM, SM	A-4	---	5-15	55-90	45-85	40-80	35
	2-25	Channery sandy loam, channery loam, very channery sandy loam, very channery loam	GM, GC-GM, SM, SC-SM	A-2, A-1, A-4	---	5-40	50-85	40-80	40-75	20
	25	Unweathered bedrock			---	---	---	---	---	-
Gilpin--------	0-2	Loam	CL, CL-ML	A-4, A-6	---	0-5	80-95	75-90	70-85	65
	2-28	Silt loam, loam, channery silt loam, silty clay loam	CL, SC, CL-ML, GC	A-2, A-6, A-4	---	0-20	50-95	45-90	35-85	30
	28-34	Very channery loam, very channery silt loam, very channery silty clay loam	GC, GC-GM	A-2, A-1, A-4, A-6	---	0-35	30-55	25-50	20-45	15
	34-44	Unweathered bedrock			---	---	---	---	---	-
Rayne---------	0-8	Silt loam	CL, ML	A-4	---	0-5	85-100	80-100	70-85	60
	8-30	Silt loam, silty clay loam, loam, channery silty clay loam	GC, GM, CL, ML	A-2, A-4, A-6	---	0-15	60-95	55-85	40-85	30
	30-40	Channery silty clay loam, silt loam, silty clay loam, loam	GP-GM, ML, GM, SM	A-1, A-4, A-2	---	5-20	50-90	40-80	30-75	20
	40-46	Weathered bedrock			---	---	---	---	---	-
	46-50	Unweathered bedrock			---	---	---	---	---	-

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	20[illegible]
	In				Pct	Pct				
FaF:										
Fedscreek-----	0-3	Sandy loam	CL-ML, ML	A-2, A-4	---	0-5	80-95	75-95	70-80	25-[illegible]
	3-61	Channery sandy loam, sandy loam, loam, channery loam	SC, SC-SM, SM, GM	A-2-4, A-4	---	0-10	50-95	50-90	40-85	25-[illegible]
	61-65	Unweathered bedrock		A-2-4, A-4	---	---	---	---	---	-[illegible]
Shelocta------	0-3	Silt loam	CL-ML, ML	A-4	---	0-5	80-95	75-95	60-95	55-[illegible]
	3-27	Silt loam, loam, very channery silt loam	CL-ML, CL, GC, SC	A-4, A-6	---	0-10	55-95	50-95	45-95	40-[illegible]
	27-56	Very channery silt loam, very channery loam, channery silty clay loam	CL, GC, GM, ML	A-1-b, A-2, A-4, A-6	0-10	0-15	40-85	35-70	25-70	20-[illegible]
	56-66	Weathered bedrock			---	---	---	---	---	-[illegible]
Handshoe------	0-7	Very channery loam	GM, ML, SM	A-2, A-4	---	5-25	45-80	40-70	35-65	30[illegible]
	7-66	Very channery loam, very channery sandy loam, channery sandy loam	ML, GM, SM, SC	A-2, A-1, A-4	---	5-50	50-85	40-80	35-70	20[illegible]
	66-80	Very channery sandy loam, extremely channery sandy loam, very channery loam, very channery loamy sand	GC, GM, SM, SC	A-1, A-2, A-4	---	5-50	55-80	35-75	25-65	15[illegible]
FkE:										
Fiveblock-----	0-14	Channery sandy loam	GM, GC-GM, SC-SM, SM	A-1, A-2	0-15	10-30	50-70	45-65	35-50	10[illegible]
	14-65	Channery sandy loam, very channery sandy loam, very flaggy sandy loam	GC-GM, SM, GM, SC-SM	A-1, A-2	0-15	10-30	45-65	25-50	15-35	10[illegible]

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	2
	In				Pct	Pct				
kE:										
Kaymine-------	0-14	Channery silt loam	GC	A-2, A-4, A-6	---	5-30	45-60	40-55	30-50	20
	14-80	Very channery silt loam, very flaggy silt loam, very channery loam	GC	A-4, A-2, A-6	---	5-30	30-55	25-50	20-45	15
LD:										
Gilpin--------	0-2	Loam	CL, CL-ML	A-4, A-6	---	0-5	80-95	75-90	70-85	65
	2-28	Loam, silt loam, silty clay loam, channery silt loam	CL, SC, CL-ML, GC	A-2, A-6, A-4	---	0-20	50-95	45-90	35-85	30
	28-34	Very channery loam, very channery silt loam, very channery silty clay loam	GC, GC-GM	A-2, A-1, A-4, A-6	---	0-35	25-55	25-50	20-45	15
	34-44	Unweathered bedrock			---	---	---	---	---	-
Shelocta------	0-3	Silt loam	CL-ML, ML	A-4	---	0-5	80-95	75-95	60-95	55
	3-27	Silt loam, loam, channery silt loam, channery loam	CL, CL-ML, SC, GC	A-4, A-6	---	0-10	55-95	50-95	45-95	40
	27-56	Channery silt loam, very channery silt loam, channery loam, channery silty clay loam	GC, GM, CL, ML	A-2, A-4, A-1-b, A-6	0-10	0-15	40-85	35-70	25-70	20
	56-66	Weathered bedrock			---	---	---	---	---	-

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	20
	In				Pct	Pct				
GmF:										
Gilpin--------	0-2	Loam	CL, CL-ML	A-4, A-6	---	0-5	80-95	75-90	70-85	65-
	2-28	Loam, silt loam, silty clay loam, channery silt loam	CL-ML, CL, GC, SC	A-2, A-6, A-4	---	0-20	50-95	45-90	35-85	30-
	28-34	Very channery, loam, very channery silt loam, very channery silty clay loam	GC, GC-GM	A-1, A-2, A-6, A-4	---	0-35	30-55	25-50	20-45	15-
	34-44	Unweathered bedrock			---	---	---	---	---	-
Summers-------	0-13	Very flaggy loam	GM, ML, SM	A-4, A-2, A-6	5-15	20-55	60-85	50-70	40-65	30-
	13-28	Very channery loam, channery loam, very flaggy loam	GM, ML, GC, SM	A-2, A-4	5-15	10-55	55-80	55-70	45-65	10-
	28-35	Very channery loam, very flaggy loam, extremely flaggy loam	GM, SM	A-2, A-6, A-4	5-15	10-50	45-60	30-45	20-45	10-
	35-39	Unweathered bedrock			---	---	---	---	---	-
Kimper--------	0-7	Silt loam	ML, CL-ML, GM, SM	A-4, A-2-4	---	0-20	90-100	90-100	50-70	20
	7-48	Channery silt loam, channery loam, very channery loam	CL-ML, CL, GM, ML	A-2-4, A-4	0-5	0-20	60-85	50-75	40-70	20
	48-52	Unweathered bedrock			---	---	---	---	---	-

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
Gr:										
Grigsby-------	0-9	Sandy loam	SC-SM, SM	A-2, A-4	---	0-5	80-100	80-100	50-95	25
	9-52	Sandy loam, fine sandy loam, loam	ML, CL, SC, SM	A-2, A-4	---	0-5	80-100	80-100	70-100	30
	52-80	Loamy sand, gravelly loamy sand, sandy loam, gravelly sandy loam	GM, SC-SM, GC-GM, SM	A-1, A-2, A-4	---	0-30	40-100	30-100	25-100	20
GuB:										
Grigsby-------	0-9	Sandy loam	SC-SM, SM	A-2, A-4	---	0-5	80-100	80-100	50-95	25
	9-52	Loam, sandy loam, fine sandy loam	CL, ML, SM, SC	A-2, A-4	---	0-5	80-100	80-100	70-100	30
	52-80	Loamy sand, gravelly loamy sand, sandy loam, gravelly sandy loam	GM, SC-SM, GC-GM, SM	A-1, A-2, A-4	---	0-30	40-100	30-100	25-100	20
Urban land.										
HaF:										
Handshoe------	0-7	Very channery loam	GM, ML, SM	A-2, A-4	---	5-25	45-85	40-70	35-65	30
	7-66	Very channery loam, channery sandy loam, very channery sandy loam	GM, SM, ML, SC	A-1, A-4, A-2	---	5-50	50-85	40-80	35-70	20
	66-80	Very channery sandy loam, extremely channery sandy loam, very channery loam, very channery loamy sand	GC, GM, SM, SC	A-1, A-2, A-4	0-10	5-50	55-80	35-75	25-65	15
Fedscreek-----	0-3	Sandy loam	SM, SC-SM	A-2, A-4	---	0-5	80-95	75-95	70-80	25
	3-61	Channery loam, sandy loam, loam channery sandy loam	SC, SM, SC-SM GM	A-2-4, A-4	---	0-10	50-95	50-90	40-85	25
	61-65	Unweathered bedrock		A-2-4, A-4	---	5-20	---	---	---	-

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	20
	In				Pct	Pct				
HaF:										
Marrowbone----	0-2	Fine sandy loam	SC, GM, SC-SM, SM	A-4	---	0-5	80-95	75-82	45-80	20-
	2-31	Fine sandy loam, channery fine sandy loam, sandy loam, loam	GC-GM, SM, SC, SC-SM	A-4, A-2-4,	---	5-10	55-95	55-90	40-80	20-
	31-37	Sandy loam, loam, channery sandy loam, fine sandy loam	SC, SM, SC-SM GC-GM	A-2-4, A-4	---	0-10	50-95	50-90	40-85	25-
	37-41	Unweathered bedrock			---	---	---	---	---	-
HeF:										
Helechawa-----	0-6	Sandy loam	SC, SC-SM, SM	A-2, A-4	---	0-10	85-100	85-100	70-90	25
	6-49	Sandy loam, fine sandy loam, gravelly fine sandy loam, gravelly loam	SC, SC-SM, SM SM, SM-SC, SC	A-2, A-4 A-2, A-4	---	0-5	85-100	85-100	70-90	25
	49-53	Unweathered bedrock			---	---	---	---	---	-
Varilla-------	0-3	Gravelly fine sandy loam	GC-GM, SM, GM, SC-SM	A-2, A-4, A-6	---	0-10	60-85	60-85	50-80	25
	3-10	Gravelly fine sandy loam, gravelly sandy loam, gravelly loam	GC-GM, SM, GM, SC-SM	A-2, A-4, A-6	---	0-10	60-85	60-85	50-80	25
	10-34	Very cobbly fine sandy loam, very gravelly fine sandy loam, very gravelly loam	SC, SC-SM, SM	A-2, A-6, A-4	---	20-40	70-90	70-90	50-80	25
	34-80	Extremely cobbly fine sandy loam, extremely cobbly loamy sand, extremely gravelly loamy sand	GC-GM, SM, GM, SC-SM	A-2	---	30-50	60-80	55-80	50-70	10

Table 14.–Engineering Index Properties–Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
HeF:										
Jefferson-----	0-6	Loam	CL, SM, ML, SC	A-2, A-4	---	0-5	85-95	80-90	40-80	25
	6-36	Loam, gravelly loam, gravelly clay loam, gravelly sandy clay loam	ML, CL, SC, SM	A-2, A-6, A-4	---	0-5	75-90	50-90	50-80	30
	36-80	Gravelly clay loam, gravelly loam, very gravelly loam	GM, GC-GM, ML, SM	A-1, A-2, A-4	---	0-5	55-75	25-75	20-70	10
HsF:										
Highsplint----	0-4	Very channery silt loam	GC-GM, CL-ML, ML, SC-SM	A-2, A-4, A-6	---	5-35	45-80	40-70	35-65	30
	4-48	Very channery silty clay loam, very channery loam, very channery silt loam	CL, SC, CL-ML, GC	A-4, A-7-6, A-6	0-10	5-35	45-75	40-70	40-70	35
	48-80	Very channery loam, very channery silty clay loam, very channery silt loam	CL, CL-ML, SC-SM, GC-GM	A-2, A-7-6, A-4, A-6	0-10	5-35	45-75	40-70	40-70	30

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
HsF:										
Shelocta------	0-5	Channery silt loam	SM, ML, GM	A-4	0-5	0-10	55-95	50-80	40-70	35
	5-46	Silt loam, silty clay loam, channery silty clay loam	CL, CL-ML, SC, GC	A-4, A-6	0-5	0-10	55-95	50-95	45-95	40
	46-52	Channery silt loam, channery silty clay loam, very channery silty clay loam	CL, ML, GC, GM	A-1-b, A-6, A-2, A-4	0-10	0-15	40-85	35-70	25-70	20
	52-56	Weathered bedrock				---	---	---	---	-
Dekalb--------	0-2	Channery sandy loam	SM, SC-SM	A-4	---	5-15	55-90	45-85	40-80	35
	2-25	Channery sandy loam, channery loam, very channery sandy loam, very channery loam	GC-GM, GM, SM, SC-SM	A-1, A-2, A-4	---	5-40	50-85	40-80	40-75	20
	25	Unweathered bedrock			---	---	---	---	---	-

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
HtF:										
Highsplint----	0-9	Channery silt loam	CL-ML, GC-GM, SC-SM, ML	A-6, A-4,	0-5	5-10	70-90	60-80	45-70	35
	9-55	Channery silt loam, very channery silt loam, very channery loam, channery loam	CL-ML, CL, GC, SC	A-4, A-6, A-7-6	0-10	5-25	45-75	40-70	40-70	35
	55-80	Very channery silt loam, extremely channery silt loam, very channery loam, extremely channery loam	CL-ML, CL, GC-GM, SC-SM	A-2, A-4, A-7-6, A-6	0-10	5-25	45-75	40-70	40-70	30
Shelocta------	0-5	Channery silt loam	ML, GM, SM	A-4	0-5	0-10	55-95	50-80	40-70	36
	5-46	Silt loam, silty clay loam, channery silty clay loam	CL, CL-ML, SC, GC	A-4, A-6	0-5	0-10	55-95	50-95	45-95	40
	46-52	Channery silt loam, channery silty clay loam, very channery silty clay loam	CL, GC, ML, GM	A-2, A-1-b, A-4, A-6	0-10	0-15	40-85	35-70	25-70	20
	52-66	Weathered bedrock			---	---	---	---	---	-

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
HtF:										
Muse----------	0-5	Silt loam	CL-ML, CL, ML	A-4, A-6	---	0-5	80-100	75-100	60-100	55
	5-40	Silty clay loam, silty clay, channery silty clay loam	CH, CL	A-6, A-7	---	0-10	70-100	65-100	60-100	55
	40-53	Channery silty clay loam, very channery silty clay loam, extremely channery silty clay loam	CL, GC, CH, MH	A-2, A-7	---	0-25	50-100	40-95	35-95	30
	53-63	Weathered bedrock			---	---	---	---	---	-
Hy:										
Holly---------	0-8	Loam	ML	A-4	---	---	90-100	85-100	80-100	70
	8-44	Silt loam, loam, sandy loam	ML, SM	A-4, A-6	---	---	85-100	75-100	70-95	45
	44-72	Silt loam, loam, sandy loam stratified loamy sand to sand to clay loam to silty clay loam	ML, SM, SP-SM	A-2, A-4, A-1-b	---	0-5	70-100	65-100	40-90	10
ImF:										
Itmann--------	0-5	Very channery sandy loam	GC-GM, GM	A-1, A-2	---	0-10	40-55	35-50	25-45	15
	5-72	Very channery sandy loam, channery sandy loam, extremely channery sandy loam	GC-GM, GM	A-1, A-2	---	0-15	30-55	25-50	20-45	10

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	2
	In				Pct	Pct				
KfF:										
Kaymine-------	0-14	Channery silt loam	GC	A-2, A-4, A-6	---	5-30	45-60	40-55	30-50	20
	14-80	Very channery silt loam, very flaggy silt loam, very channery loam	GC	A-4, A-2, A-6	---	5-30	30-55	25-50	20-45	15
Fairpoint-----	0-4	Channery silty clay loam	CL, GC, SC	A-6, A-7	---	10-20	55-90	45-80	40-80	35
	4-72	Very channery silty clay loam, very channery clay loam, channery silty clay loam, very channery loam	CL-ML, CL, GC, SC	A-4, A-2, A-6, A-7	---	15-30	55-75	25-65	20-65	15
Fiveblock-----	0-14	Channery sandy loam	GM, GC-GM, SC-SM, SM	A-1, A-2	0-15	10-30	50-70	45-65	35-50	10
	14-65	Channery sandy loam, very channery sandy loam, very flaggy sandy loam	GM, SC-SM, GC-GM, SM	A-1, A-2	0-15	10-30	45-65	25-50	15-35	10
KrF:										
Kimper--------	0-6	Silt loam	CL-ML, ML, SM	A-4	---	0-5	90-100	90-100	30-70	20
	6-62	Silt loam, channery silt loam, loam, channery loam	CL, ML, CL-ML, GM	A-2-4, A-4	---	5-20	50-85	50-75	30-70	20
	62-80	Loam, channery loam, very channery loam, silt loam	CL-ML, CL, GM, ML	A-1-b, A-2-4, A-4	0-5	5-15	40-85	40-75	30-70	20

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	20
	In				Pct	Pct				
KrF:										
Cloverlick----	0-9	Channery loam	CL-ML, CL, SC, SC-SM	A-4, A-7, A-6	---	5-10	60-90	50-85	40-80	35-
	9-35	Channery loam, very channery loam, channery silt loam, very channery silt loam	CL-ML, SM, ML, SC-SM	A-4, A-7, A-6	---	5-20	50-90	40-85	40-85	35-
	35-80	Very channery loam, very flaggy loam, extremely channery loam, very channery silt loam	CL-ML, SM, ML, SC-SM	A-2, A-4, A-6	---	5-35	40-80	40-75	35-70	30-
Renox---------	0-5	Silt loam	CL-ML, CL, ML	A-4	0-2	0-3	90-100	85-95	80-90	70
	5-30	Loam, silt loam, channery loam, channery silt loam	GM, CL, ML, SC	A-2, A-4, A-6	0-2	0-3	65-95	50-90	40-80	30
	30-80	Channery silty clay loam, silty clay loam, very channery silty clay loam	GC, SC, GM, ML	A-2, A-4, A-6	0-5	0-5	55-90	45-85	35-75	30
Pt.										
Pits, quarries										
RgB:										
Rowdy---------	0-10	Loam	CL, SM, ML, SC	A-4	---	0-5	80-100	80-100	70-100	40
	10-47	Loam, silt loam, fine sandy loam, sandy clay loam	GM, CL, ML, SC	A-2, A-4, A-6	---	0-5	60-100	60-100	50-100	25
	47-80	Loam, clay loam, sandy clay loam, sandy loam, fine sandy loam	GC-GM, CL, ML, SC-SM	A-1-b, A-2, A-6, A-4	---	0-25	30-100	30-100	25-100	20

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
RgB:										
Grigsby-------	0-9	Sandy loam	SC-SM, SM	A-2, A-4	---	0-5	80-100	80-100	50-95	25
	9-52	Loam, sandy loam, fine sandy loam	CL, ML, SM, SC	A-2, A-4	---	0-5	80-100	80-100	70-100	30
	52-80	Loamy sand, sandy loam, gravelly loamy sand, gravelly sandy loam	GM, GC-GM, SC-SM, SM	A-1, A-2, A-4	---	0-30	40-100	30-100	25-100	20
ShF:										
Shelocta------	0-3	Silt loam	CL-ML, ML	A-4	---	0-5	80-95	75-95	60-95	55
	3-27	Silt loam, loam, channery silt loam, channery loam	CL, CL-ML, SC, GC	A-4, A-6	---	0-10	55-95	50-95	45-95	40
	27-56	Channery silt loam, channery silty clay loam, very channery silt loam, channery loam	GC, GM, CL, ML	A-1-b, A-2, A-6, A-4	0-10	0-15	40-85	35-70	25-70	20
	56-66	Weathered bedrock			---	---	---	---	---	-
Highsplint----	0-9	Silt loam	GC-GM, CL-ML, ML, SC-SM	A-2, A-4, A-6	0-5	5-10	70-90	60-80	45-70	35
	9-55	Very channery silt loam, very channery loam, channery loam, channery silt loam	CL, SC, CL-ML, GC	A-4, A-7-6, A-6	0-10	5-25	45-75	40-70	40-70	35
	55-80	Very channery silt loam, very channery loam, extremely channery silt loam, extremely channery loam	CL, CL-ML, SC-SM, GC-GM	A-2, A-7-6, A-4, A-6	0-10	5-25	45-75	40-70	40-70	30

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
SmF:										
Shelocta------	0-5	Channery silt loam	GM, ML, SM	A-4	0-5	0-10	55-95	50-80	40-70	36
	5-46	Silt loam, silty clay loam, channery silty loam	CL, CL-ML, SC, GC	A-4, A-6	0-5	0-10	55-95	50-95	45-95	40
	46-52	Channery silt loam, channery silty clay loam, very channery clay loam	CL, ML, GC, GM	A-1-b, A-6, A-2, A-4	0-10	0-15	40-85	35-70	25-70	20
	52-56	Weathered bedrock bedrock			---	---	---	---	---	-
Muse----------	0-6	Silt loam	CL-ML, CL, ML	A-4, A-6	---	0-5	80-100	70-100	60-100	55
	6-46	Silty clay loam, clay, channery silty clay	CH, CL	A-6, A-7	---	0-10	70-100	65-100	60-100	55
	46-53	Channery clay, channery silty clay, very channery silty clay	CL, CH, GC, MH	A-2, A-7	---	0-25	50-100	40-95	35-95	30
	53-57	Weathered bedrock			---	---	---	---	---	-
UdE. Udorthents-Urban land										
UrC. Urban land-Udorthents										

Table 14.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
UuB:										
Urban land.										
Udorthents.										
Grigsby-------	0-9	Sandy loam	SC-SM, SM	A-2, A-4	---	0-5	80-100	80-100	50-95	25
	9-52	Loam, sandy loam, fine sandy loam	CL, ML, SM, SC	A-2, A-4	---	0-5	80-100	80-100	70-100	30
	52-80	Loamy sand, gravelly loamy sand, sandy loam, gravelly sandy loam	GC-GM, GM, SM, SC-SM	A-1, A-4, A-2	---	0-30	40-100	30-100	25-100	20
VaF:										
Varilla-------	0-3	Channery sandy loam	GM, SC-SM, SM	A-2, A-4, A-6	---	0-10	70-85	70-85	50-80	25
	3-14	Channery sandy loam, channery loam, channery fine sandy loam	SM, SC-SM, SC	A-2, A-6, A-4	---	0-10	60-85	60-85	50-80	25
	14-65	Very channery sandy loam, extremely channery sandy loam, very channery loam	SM, GC-GM, SC-SM, GM	A-2, A-6, A-4	---	20-40	60-85	50-80	40-70	25
	65-75	Extremely channery sandy loam, very, channery sandy loam, very channery loam	GM, GC-GM, SC-SM, SM	A-2	---	30-50	55-80	45-80	35-70	10
Jefferson-----	0-13	Loam	CL, SM, ML, SC	A-2, A-4	---	0-5	85-95	80-90	40-80	25
	13-48	Loam, channery loam, channery clay loam	CL, SM, ML, SC	A-2, A-6, A-4	---	5-15	75-90	50-90	50-80	30
	48-62	Very channery clay loam, channery loam, very channery loam	GM, GC-GM, ML, SM	A-2, A-1, A-4	---	10-30	55-75	25-75	20-70	10
	62-66	Unweathered bedrock			---	---	---	---	---	-

Table 14.–Engineering Index Properties–Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--			
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	2
	In				Pct	Pct				
VaF:										
Altricrest-----	0-3	Sandy loam	SM, SC-SM,	A-2, A-4	---	0-5	80-100	75-100	55-80	25
	3-25	Sandy loam, loam, channery sandy loam	ML, SC-SM, CL-ML, SM	A-2, A-4	---	0-5	80-100	75-100	55-85	25
	25-30	Weathered bedrock			---	---	---	---	---	-
	30-34	Unweathered bedrock			---	---	---	---	---	-
W.										
Water										

Table 15.—Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AlC-----------Allegheny	0-7	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low------	0.32	5	1-4
	7-72	18-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low------	0.28		
	72-80	10-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low------	0.28		
AtF*:										
Alticrest----	0-3	8-18	1.40-1.55	2.0-6.0	0.12-0.18	4.5-5.5	Low------	0.24	2	1-2
	3-25	8-27	1.40-1.55	2.0-6.0	0.10-0.16	4.5-5.5	Low------	0.20		
	25-30	---	---	---	---	---	---------	----		
	30	---	---	---	---	---	---------	----		
Ramsey-------	0-1	8-20	1.25-1.50	6.0-20	0.09-0.12	4.5-5.5	Low------	0.20	1	1-2
	1-17	8-25	1.20-1.40	6.0-20	0.09-0.12	4.5-5.5	Low------	0.17		
	17-21	---	---	---	---	---	---------	----		
Wallen-------	0-2	8-20	1.40-1.55	2.0-6.0	0.07-0.11	4.5-5.5	Low------	0.17	2	1-2
	2-24	8-27	1.40-1.55	2.0-6.0	0.05-0.09	4.5-5.5	Low------	0.17		
	24-28	---	---	---	---	---	---------	----		
BcG*:										
Berks--------	0-3	12-27	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low------	0.17	3	1-3
	3-17	7-27	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low------	0.17		
	17-27	7-27	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low------	0.17		
	27-31	---	---	---	---	---	---------	----		
Caneyville---	0-5	12-27	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low------	0.43	2	2-4
	5-22	12-40	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate-	0.28		
	22-26	---	---	---	---	---	---------	----		
CbF*:										
Caneyville---	0-8	27-40	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low------	0.43	2	2-4
	8-36	12-40	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate-	0.28		
	36	---	---	---	---	---	---------	----		
Renox--------	0-5	12-27	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Low------	0.32	4	1-4
	5-30	18-34	1.20-1.45	0.6-2.0	0.10-0.16	5.1-7.3	Low------	0.17		
	30-80	12-40	1.25-1.45	0.6-2.0	0.18-0.22	5.1-7.3	Low------	0.17		
Bledsoe------	0-12	12-27	1.20-1.50	0.6-2.0	0.16-0.21	5.6-7.8	Low------	0.37	5	2-4
	12-43	35-50	1.30-1.60	0.2-0.6	0.12-0.19	5.6-7.8	Moderate-	0.32		
	43-80	40-60	1.35-1.60	0.06-0.6	0.12-0.19	5.6-7.8	Moderate-	0.32		
CgF*:										
Cloverlick---	0-6	18-27	1.00-1.20	0.6-2.0	0.20-0.24	3.6-6.5	Low------	0.10	5	5-15
	6-22	15-30	1.10-1.30	0.6-2.0	0.18-0.24	3.6-5.5	Low------	0.10		
	22-41	15-30	1.30-1.50	0.6-2.0	0.12-0.20	3.6-5.5	Low------	0.10		
	41-70	15-27	1.30-1.60	0.6-2.0	0.05-0.12	3.6-5.5	Low------	0.10		
Guyandotte---	0-17	7-27	1.00-1.30	0.6-2.0	0.10-0.16	3.6-6.5	Low------	0.10	5	2-10
	17-80	5-27	1.30-1.60	0.6-2.0	0.05-0.15	3.6-5.5	Low------	0.17		
Highsplint---	0-3	15-27	1.10-1.30	0.6-6.0	0.07-0.15	3.6-6.5	Low------	0.17	4	.5-5
	3-28	18-34	1.30-1.55	0.6-6.0	0.07-0.13	3.6-5.5	Low------	0.17		
	28-80	18-34	1.55-1.70	0.6-2.0	0.05-0.11	3.6-5.5	Low------	0.17		

See footnote at end of table.

Table 15.—Physical and Chemical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
CkF*:										
Cloverlick---	0-9	7-27	1.00-1.20	0.6-2.0	0.20-0.24	3.6-6.5	Low------	0.17	3	5-15
	9-35	7-27	1.10-1.30	0.6-2.0	0.18-0.24	3.6-5.5	Low------	0.17		
	35-80	7-27	1.30-1.50	0.6-2.0	0.12-0.20	3.6-5.5	Low------	0.17		
Kimper-------	0-6	7-27	1.15-1.30	0.6-2.0	0.15-0.22	5.1-7.3	Low------	0.32	3	2-15
	6-62	18-27	1.20-1.70	0.6-2.0	0.13-0.20	4.5-6.0	Low------	0.17		
	62-80	12-27	1.20-1.70	0.6-2.0	0.10-0.16	4.5-6.0	Low------	0.17		
Highsplint---	0-9	15-27	1.10-1.30	0.6-2.0	0.07-0.15	3.6-6.5	Low------	0.17	3	.5-5.
	9-55	18-34	1.30-1.55	0.6-2.0	0.07-0.13	3.6-6.0	Low------	0.17		
	55-80	18-34	1.55-1.70	0.2-2.0	0.05-0.11	3.6-6.0	Low------	0.17		
CsF*:										
Cloverlick---	0-9	7-27	1.00-1.20	0.6-2.0	0.20-0.24	3.6-6.5	Low------	0.17	3	5-15
	9-35	7-27	1.10-1.30	0.6-2.0	0.18-0.24	3.6-6.0	Low------	0.17		
	35-80	7-27	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.0	Low------	0.17		
Shelocta-----	0-3	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-6.5	Low------	0.32	3	.5-5
	3-27	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low------	0.28		
	27-56	15-34	1.30-1.55	0.6-2.0	0.08-0.16	4.5-5.5	Low------	0.17		
	56-66	---	---	---	---	---	---------	----		
Kimper-------	0-6	7-27	1.15-1.30	0.6-2.0	0.15-0.22	5.1-7.3	Low------	0.32	3	2-15
	6-62	18-27	1.20-1.70	0.6-2.0	0.13-0.20	4.5-6.0	Low------	0.17		
	62-80	12-27	1.20-1.70	0.6-2.0	0.10-0.16	4.5-6.0	Low------	0.17		
DAM*. Dam										
DgF*:										
Dekalb-------	0-2	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low------	0.24	2	2-4
	2-25	7-27	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low------	0.17		
	25-29	---	---	---	---	---	---------	----		
Gilpin-------	0-2	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low------	0.32	3	.5-4
	2-28	18-34	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low------	0.24		
	28-34	15-34	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low------	0.24		
	34-44	---	---	---	---	---	---------	----		
Marrowbone---	0-2	5-18	1.20-1.60	2.0-6.0	0.10-0.18	4.8-6.0	Low------	0.24	2	.5-5
	2-31	5-18	1.20-1.70	2.0-6.0	0.08-0.16	4.8-6.0	Low------	0.17		
	31-37	5-18	1.20-1.70	2.0-6.0	0.08-0.16	4.8-6.0	Low------	0.17		
	37-41	---	---	---	---	---	---------	----		
DrF*:										
Dekalb-------	0-2	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low------	0.24	2	2-4
	2-25	7-27	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low------	0.17		
	25-29	---	---	---	---	---	---------	----		
Gilpin-------	0-2	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low------	0.32	3	.5-4
	2-28	18-34	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low------	0.24		
	28-34	15-34	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low------	0.24		
	34-44	---	---	---	---	---	---------	----		
Rayne--------	0-8	10-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low------	0.28	4	1-3
	8-30	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low------	0.20		
	30-40	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low------	0.20		
	40-46	---	---	---	---	---	---------	----		
	46-50	---	---	---	---	---	---------	----		

See footnote at end of table.

Table 15.—Physical and Chemical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
FaF*:										
Fedscreek----	0-3	5-18	1.00-1.60	2.0-6.0	0.12-0.22	4.5-6.0	Low------	0.24	3	.5-5
	3-61	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low------	0.17		
	61-65	---	---	---	---	---	---------	----		
Shelocta-----	0-3	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-6.5	Low------	0.32	3	.5-5
	3-27	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low------	0.28		
	27-56	15-34	1.30-1.55	0.6-2.0	0.08-0.16	4.5-5.5	Low------	0.17		
	56-66	---	---	---	---	---	---------	----		
Handshoe-----	0-7	7-18	1.20-1.40	2.0-6.0	0.10-0.14	3.6-5.5	Low------	0.15	5	2-4
	7-66	7-18	1.20-1.40	2.0-6.0	0.08-0.12	3.6-5.5	Low------	0.15		
	66-80	5-15	1.20-1.40	2.0-6.0	0.06-0.12	3.6-5.5	Low------	0.10		
FkE*:										
Fiveblock----	0-14	5-18	1.35-1.65	6.0-20	0.05-0.12	5.6-7.8	Low------	0.32	5	<.5
	14-65	5-18	1.35-1.65	6.0-20	0.05-0.12	5.6-7.8	Low------	0.32		
Kaymine------	0-14	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low------	0.32	5	<.5
	14-80	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low------	0.32		
GlD*:										
Gilpin-------	0-2	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low------	0.32	3	.5-4
	2-28	18-34	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low------	0.24		
	28-34	15-34	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low------	0.24		
	34-44	---	---	---	---	---	---------	----		
Shelocta-----	0-3	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-6.5	Low------	0.32	3	.5-5
	3-27	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low------	0.28		
	27-56	15-34	1.30-1.55	0.6-2.0	0.08-0.16	4.5-5.5	Low------	0.17		
	56-66	---	---	---	---	---	---------	----		
GmF*:										
Gilpin-------	0-2	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low------	0.32	3	.5-4
	2-28	18-34	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low------	0.24		
	28-34	15-34	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low------	0.24		
	34-44	---	---	---	---	---	---------	----		
Summers------	0-13	10-20	1.20-1.40	2.0-6.0	0.09-0.14	4.5-5.5	Low------	0.20	2	3-5
	13-28	8-18	1.20-1.50	2.0-6.0	0.09-0.14	4.5-5.5	Low------	0.20		
	28-35	7-15	1.20-1.50	2.0-6.0	0.06-0.10	4.5-5.5	Low------	0.20		
	35-39	---	---	---	---	---	---------	----		
Kimper-------	0-7	7-27	1.15-1.30	0.6-2.0	0.15-0.22	5.1-7.3	Low------	0.32	3	2-15
	7-48	18-27	1.20-1.70	0.6-2.0	0.13-0.20	5.1-7.3	Low------	0.17		
	48-52	---	---	---	---	---	Low------	----		
Gr------------ Grigsby	0-9	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low------	0.28	5	1-4
	9-52	5-18	1.20-1.50	2.0-6.0	0.10-0.20	5.6-7.3	Low------	0.28		
	52-80	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.6-7.3	Low------	0.28		
GuB*:										
Grigsby------	0-9	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low------	0.28	5	1-4
	9-52	5-18	1.20-1.50	2.0-6.0	0.10-0.20	5.6-7.3	Low------	0.28		
	52-80	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.6-7.3	Low------	0.28		
Urban land.										

See footnote at end of table.

Table 15.—Physical and Chemical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
HaF*:										
Handshoe-----	0-7	7-18	1.20-1.40	2.0-6.0	0.10-0.14	3.6-5.5	Low------	0.15	5	2-4
	7-66	7-18	1.20-1.40	2.0-6.0	0.08-0.12	3.6-5.5	Low------	0.15		
	66-80	5-15	1.20-1.40	2.0-6.0	0.06-0.12	3.6-5.5	Low------	0.10		
Fedscreek----	0-3	5-18	1.00-1.60	2.0-6.0	0.12-0.22	4.5-6.0	Low------	0.24	3	.5-5
	3-61	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low------	0.17		
	61-65	---	---	---	---	---	---------	----		
Marrowbone---	0-2	5-18	1.20-1.60	2.0-6.0	0.10-0.18	4.8-6.0	Low------	0.24	2	.5-5
	2-31	5-18	1.20-1.70	2.0-6.0	0.08-0.16	4.8-6.0	Low------	0.17		
	31-37	5-18	1.20-1.70	2.0-6.0	0.08-0.16	4.8-6.0	Low------	0.17		
	37-41	---	---	---	---	---	---------	----		
HeF*:										
Helechawa----	0-6	4-15	1.10-1.40	2.0-6.0	0.10-0.18	3.6-6.5	Low------	0.15		2-10
	6-49	7-18	1.35-1.70	2.0-6.0	0.08-0.14	3.6-5.5	Low------	0.20		
	49-53	---	---	---	---	---	---------	----		
Varilla------	0-3	3-20	1.00-1.40	2.0-6.0	0.10-0.13	3.6-6.5	Low------	0.20	3	1-6
	3-10	3-27	1.35-1.55	2.0-6.0	0.10-0.13	3.6-6.5	Low------	0.20		
	10-34	3-27	1.45-1.65	2.0-6.0	0.05-0.10	3.6-6.5	Low------	0.10		
	34-80	3-20	1.45-1.65	2.0-20	0.01-0.05	3.6-6.5	Low------	0.10		
Jefferson----	0-6	10-20	1.30-1.50	2.0-6.0	0.10-0.18	4.5-7.3	Low------	0.24	5	.5-5
	6-36	18-34	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low------	0.28		
	36-80	18-34	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low------	0.28		
HsF*:										
Highsplint---	0-4	15-27	1.10-1.30	0.6-6.0	0.07-0.15	3.6-6.5	Low------	0.17	3	.5-5
	4-48	18-34	1.30-1.55	0.6-6.0	0.07-0.13	3.6-5.5	Low------	0.17		
	48-80	18-34	1.55-1.70	0.2-2.0	0.05-0.11	3.6-5.5	Low------	0.17		
Shelocta-----	0-5	10-25	1.15-1.30	0.6-2.0	0.10-0.18	4.5-5.5	Low------	0.28	3	.5-5
	5-46	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low------	0.28		
	46-52	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low------	0.17		
	52-56	---	---	---	---	---	---------	----		
Dekalb-------	0-2	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low------	0.24	2	2-4
	2-25	7-27	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low------	0.17		
	25-29	---	---	---	---	---	---------	----		
HtF*:										
Highsplint---	0-9	15-27	1.10-1.30	0.6-2.0	0.07-0.15	3.6-6.5	Low------	0.17	3	.5-5
	9-55	18-34	1.30-1.55	0.6-2.0	0.07-0.13	3.6-5.5	Low------	0.17		
	55-80	18-34	1.55-1.70	0.2-2.0	0.05-0.11	3.6-5.5	Low------	0.17		
Shelocta-----	0-5	10-25	1.15-1.30	0.6-2.0	0.10-0.18	4.5-5.5	Low------	0.28	3	.5-5
	5-46	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low------	0.28		
	46-52	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low------	0.17		
	52-56	---	---	---	---	---	---------	----		
Muse---------	0-5	7-27	1.20-1.40	0.6-2.0	0.16-0.22	4.5-5.5	Low------	0.37	4	1-3
	5-40	28-60	1.20-1.65	0.06-0.2	0.10-0.16	4.5-5.5	Moderate-	0.28		
	40-53	40-60	1.40-1.65	0.06-0.2	0.08-0.14	4.5-5.5	Moderate-	0.28		
	53-63	---	---	---	---	---	---------	----		

See footnote at end of table.

Table 15.—Physical and Chemical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility-	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Hy------------ Holly	0-8	15-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low------	0.28	5	2-5
	8-44	18-30	1.20-1.50	0.6-2.0	0.17-0.21	5.6-7.3	Low------	0.28		
	44-72	10-27	1.20-1.40	0.6-6.0	0.07-0.18	5.6-7.3	Low------	0.28		
ImF----------- Itmann	0-5	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low------	0.32	5	<.5
	5-72	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low------	0.32		
KfF*:										
Kaymine------	0-14	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low------	0.32	5	<.5
	14-80	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low------	0.32		
Fairpoint----	0-4	27-35	1.45-1.65	0.2-0.6	0.06-0.15	5.6-7.3	Low------	0.28	5	<.5
	4-72	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-	0.28		
Fiveblock----	0-14	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low------	0.32	5	<.5
	14-65	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low------	0.32		
KrF*:										
Kimper-------	0-6	7-27	1.15-1.30	0.6-2.0	0.15-0.22	5.1-7.3	Low------	0.32	3	2-15
	6-62	18-27	1.20-1.70	0.6-2.0	0.13-0.20	4.5-6.0	Low------	0.17		
	62-80	12-27	1.20-1.70	0.6-2.0	0.10-0.16	4.5-6.0	Low------	0.17		
Cloverlick---	0-9	7-27	1.00-1.20	0.6-2.0	0.20-0.24	3.6-6.5	Low------	0.17	3	5-15
	9-35	7-27	1.10-1.30	0.6-2.0	0.18-0.24	3.6-6.0	Low------	0.17		
	35-80	7-27	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.0	Low------	0.17		
Renox--------	0-5	12-27	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Low------	0.32	4	1-4
	5-30	18-34	1.20-1.45	0.6-2.0	0.10-0.16	5.1-7.3	Low------	0.17		
	30-80	12-40	1.25-1.45	0.6-2.0	0.18-0.22	5.1-7.3	Low------	0.17		
Pt*. Pits, quarries										
RgB*:										
Rowdy--------	0-10	10-27	1.20-1.40	0.6-2.0	0.11-0.21	4.5-7.3	Low------	0.32	5	1-3
	10-47	18-27	1.20-1.50	0.6-2.0	0.09-0.21	4.5-6.0	Low------	0.28		
	47-80	27-40	1.20-1.50	0.6-6.0	0.07-0.18	4.5-6.0	Low------	0.28		
Grigsby------	0-9	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low------	0.28	5	1-4
	9-52	5-18	1.20-1.50	2.0-6.0	0.10-0.20	5.6-7.3	Low------	0.28		
	52-80	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.6-7.3	Low------	0.28		
ShF*:										
Shelocta-----	0-3	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low------	0.32	3	.5-5
	3-27	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low------	0.28		
	27-56	15-34	1.30-1.55	0.6-2.0	0.08-0.16	4.5-5.5	Low------	0.17		
	56-66	---	---	---	---	---	---------	----		
Highsplint---	0-9	15-27	1.10-1.30	0.6-2.0	0.07-0.15	3.6-6.5	Low------	0.17	3	.5-5
	9-55	18-34	1.30-1.55	0.6-2.0	0.07-0.13	3.6-6.0	Low------	0.17		
	55-80	18-34	1.55-1.70	0.2-2.0	0.05-0.11	3.6-6.0	Low------	0.17		
SmF*:										
Shelocta-----	0-5	10-25	1.15-1.30	0.6-2.0	0.10-0.18	4.5-5.5	Low------	0.28	3	.5-5
	5-46	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low------	0.28		
	46-52	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low------	0.17		
	52-56	---	---	---	---	---	---------	----		

See footnote at end of table.

Table 15.—Physical and Chemical Properties of the Soils—Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
SmF*:										
Muse----------	0-6	7-27	1.20-1.40	0.6-2.0	0.16-0.22	4.5-5.5	Low-------	0.37	3	1-3
	6-46	28-60	1.20-1.65	0.06-0.2	0.10-0.16	4.5-5.5	Moderate-	0.28		
	46-53	40-60	1.40-1.65	0.06-0.2	0.08-0.14	4.5-5.5	Moderate-	0.28		
	53-57	---	---	---	---	---	---------	----		
UdF*. Udorthents- Urban land										
UrD*. Urban land- Udorthents										
UuB*: Urban land.										
Udorthents.										
Grigsby-------	0-9	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low-------	0.28	5	1-4
	9-52	5-18	1.20-1.50	2.0-6.0	0.10-0.20	5.6-7.3	Low-------	0.28		
	52-80	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.1-7.3	Low-------	0.28		
VaF*:										
Varilla-------	0-3	3-20	1.00-1.40	2.0-6.0	0.10-0.13	3.6-6.5	Low-------	0.20	3	1-6
	3-14	3-27	1.35-1.55	2.0-6.0	0.10-0.13	3.6-5.5	Low-------	0.20		
	14-65	3-27	1.45-1.65	2.0-6.0	0.05-0.10	3.6-5.5	Low-------	0.10		
	65-75	3-27	1.45-1.65	2.0-6.0	0.05-0.05	3.6-5.5	Low-------	0.10		
Jefferson-----	0-13	10-20	1.30-1.50	2.0-6.0	0.10-0.18	4.5-7.3	Low-------	0.24	5	.5-5
	13-48	10-27	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low-------	0.28		
	48-62	15-30	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low-------	0.28		
	62-66	---	---	---	---	---	---------	----		
Alticrest-----	0-3	8-18	1.40-1.55	2.0-6.0	0.12-0.18	4.5-5.5	Low-------	0.24	2	1-3
	3-25	8-27	1.40-1.55	2.0-6.0	0.10-0.16	4.5-5.5	Low-------	0.20		
	25-30	---	---	---	---	---	---------	----		
	30-34	---	---	---	---	---	---------	----		
W*. Water										

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.–Soil and Water Features

("Flooding" and "water table" and terms such as "rare," "brief," and "apparent" are explained in symbol < means less than; > means more than. Absence of an entry indicates that the feature or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	U
					Ft			In		
AlC-------------- Allegheny	B	None--------	---	---	>6.0	---	---	>60	---	L
AtF*:										
Alticrest--------	B	None--------	---	---	>6.0	---	---	20-40	Hard	L
Ramsey-----------	D	None--------	---	---	>6.0	---	---	7-20	Hard	L
Wallen-----------	B	None--------	---	---	>6.0	---	---	20-40	Hard	L
BcG*:										
Berks------------	C	None--------	---	---	>6.0	---	---	20-40	Hard	L
Caneyville-------	C	None--------	---	---	>6.0	---	---	20-40	Hard	H
CbF*:										
Caneyville-------	C	None--------	---	---	>6.0	---	---	20-40	Hard	H
Renox------------	B	None--------	---	---	>6.0	---	---	>60	---	L
Bledsoe----------	C	None--------	---	---	>6.0	---	---	>60	---	M
CgF*:										
Cloverlick-------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Guyandotte-------	B	None--------	---	---	>6.0	---	---	>60	---	L
Highsplint-------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
CkF*:										
Cloverlick-------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Kimper-----------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Highsplint-------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
CsF*:										
Cloverlick-------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Shelocta---------	B	None--------	---	---	>6.0	---	---	>40	Hard	L

See footnote at end of table.

Table 16.—Soil and Water Features—Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		U
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	U
					Ft			In		
CsF*:										
Kimper	B	None	---	---	>6.0	---	---	>60	Hard	L
DAM*.										
Dam										
DgF*:										
Dekalb	C	None	---	---	>6.0	---	---	20-40	Hard	L
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	L
Marrowbone	C	None	---	---	>6.0	---	---	20-40	Hard	L
DrF*:										
Dekalb	C	None	---	---	>6.0	---	---	20-40	Hard	L
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	L
Rayne	B	None	---	---	>6.0	---	---	>40	Soft	L
FkF*:										
Fedscreek	B	None	---	---	>6.0	---	---	>60	Hard	L
Shelocta	B	None	---	---	>6.0	---	---	>40	Hard	L
Handshoe	B	None	---	---	>6.0	---	---	40-80	Hard	L
FmF*:										
Fiveblock	C	None	---	---	>6.0	---	---	>60	---	L
Kaymine	C	None	---	---	>6.0	---	---	>60	---	L
GlF*:										
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	L
Shelocta	B	None	---	---	>6.0	---	---	>40	Hard	L
GmF*:										
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	L
Summers	B	None	---	---	>6.0	---	---	20-40	Hard	L
Kimper	B	None	---	---	>6.0	---	---	>60	Hard	L

See footnote at end of table.

Table 16.—Soil and Water Features—Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	U
					Ft			In		
Gr---------------- Grigsby	B	Occasional	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	L
GuB*: Grigsby----------	B	Occasional	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	L
Urban land.										
HaF*: Handshoe---------	B	None--------	---	---	>6.0	---	---	40-80	Hard	L
Fedscreek--------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Marrowbone-------	C	None--------	---	---	>6.0	---	---	20-40	Hard	L
HeF*: Helechawa--------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Varilla----------	B	None--------	---	---	>6.0	---	---	>68	Hard	L
Jefferson--------	B	None--------	---	---	>6.0	---	---	>60	---	M
HsF*: Highsplint-------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Shelocta---------	B	None--------	---	---	>6.0	---	---	>40	Hard	L
Dekalb-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	L
HtF*: Highsplint-------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Shelocta---------	B	None--------	---	---	>6.0	---	---	>40	Hard	L
Muse-------------	C	None--------	---	---	>4.0	Apparent	Jan-Apr	>40	Soft	H
Hy---------------- Holly	B/D	Frequent----	Brief-----	---	0-1.0	Apparent	Dec-May	>60	---	H
ImF--------------- Itman	C	None--------	---	---	>6.0	---	---	>60	---	H

See footnote at end of table.

Table 16.—Soil and Water Features—Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		U
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
KfF*:										
Kaymine	C	None	---	---	>6.0	---	---	>60	---	L
Fairpoint	C	None	---	---	>6.0	---	---	>60	---	L
Fiveblock	C	None	---	---	>6.0	---	---	>60	---	L
KrF*:										
Kimper	B	None	---	---	>6.0	---	---	>60	Hard	L
Cloverlick	B	None	---	---	>6.0	---	---	>60	Hard	L
Renox	B	None	---	---	>6.0	---	---	>60	---	L
Pt*. Pits, quarries										
RgB*:										
Rowdy	B	Occasional	Very brief	Jan-Apr	>6.0	---	---	>60	---	M
Grigsby	B	Occasional	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	L
ShF*:										
Shelocta	B	None	---	---	>6.0	---	---	>40	Hard	L
Highsplint	B	None	---	---	>6.0	---	---	>60	Hard	L
SmF*:										
Shelocta	B	None	---	---	>6.0	---	---	>40	Hard	L
Muse	C	None	---	---	>4.0	Apparent	Jan-Apr	>40	Soft	H
UdF*. Udorthents-Urban land										
UrD*. Urban land-Udorthents										

See footnote at end of table.

Table 16.—Soil and Water Features—Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	U
					Ft			In		
UuB*. Urban land.										
Udorthents.										
Grigsby----------	B	Rare--------	Very brief	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	L
VaF*:										
Varilla----------	B	None--------	---	---	>6.0	---	---	>60	Hard	L
Jefferson--------	B	None--------	---	---	>6.0	---	---	>60	---	M
Alticrest--------	B	None--------	---	---	>6.0	---	---	20-40	Hard	L
W*. Water										

* See description of the map unit for composition and behavior characteristics of the map uni

Table 17.–Physical Analyses of Selected Soils

(The soils are the typical pedons for the soil series in the survey area. For the location of the pedons, see the section "Soil Series and Their Morphology")

Soil name, report number, horizon, and depth in inches	Total: Sand	Total: Silt	Total: Int. IV Clay (<0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Textural class*
	Pct <2 mm								
Rowdy:									
(95-KY-119-4)									
A-------- 0-10	38.3	43.3	18.4	0.4	1.9	10.2	15.0	10.8	l
BA------- 10-16	43.8	37.4	18.8	0.3	1.9	6.6	18.7	17.0	l
Bw1------ 16-27	46.6	36.2	17.2	0.2	0.9	4.1	21.0	20.4	l
Handshoe:									
(94KY-119-6)									
A-------- 0-7	51.3	40.0	8.7	4.7	5.8	14.3	18.7	7.8	l
BA ------ 7-14	51.3	35.3	13.4	4.4	5.1	14.2	19.1	8.5	l
Bw1------ 14-32	61.3	29.3	9.4	7.2	7.5	16.5	20.7	9.4	sl
Bw2------ 32-48	51.2	35.0	13.8	4.1	5.1	13.8	19.2	9.0	l
Jefferson:									
(94KY-133-5)									
A-------- 0-1	50.5	35.6	13.9	4.9	6.9	21.3	13.7	3.7	l
AB------- 1-4	45.2	37.2	17.6	1.8	3.6	22.3	13.2	4.3	l
BA------- 4-13	46.1	37.5	16.4	2.2	2.7	20.8	14.8	5.6	l
Bt1------ 13-19	43.1	39.0	17.9	2.1	3.0	19.5	13.8	4.7	l
Bt2------ 19-33	40.2	36.4	23.4	2.3	3.2	18.3	11.7	4.7	l
Muse:									
(95KY-133-10)									
A-------- 0-5	15.8	57.9	26.3	3.8	4.4	2.9	2.0	2.7	sil
Bt1------ 5-10	5.8	58.0	36.2	0.9	1.5	1.3	0.9	1.2	sicl
Bt2------ 10-22	7.0	57.9	35.1	2.0	1.7	1.2	0.9	1.2	sicl
Bt3------ 22-32	8.9	54.9	36.2	3.1	2.5	1.8	0.8	0.7	sicl
Summers:									
(95KY-133-9)									
A-------- 0-6	43.5	35.4	21.1	4.6	7.8	21.0	7.6	2.5	l
AB------- 6-13	43.1	35.7	21.2	4.4	7.5	21.0	7.4	2.8	l
Bw1------ 13-22	35.8	42.0	22.2	2.6	5.1	19.3	6.5	2.3	l
Bw2------ 22-28	34.7	41.1	24.2	2.5	4.4	18.2	7.0	2.6	l
C-------- 28-35	38.4	35.3	26.3	2.7	4.1	19.7	8.7	3.2	l

* The letter "l" means loam; "sil," silt loam; "sl," sandy loam; and "sicl," silty clay loam.

Table 18.–Chemical Analyses of Selected Soils

(Absence of an entry indicates that the determination was not made. The pedons are typical of the soil ser area. For the location of the pedons, see the section "Soil Series and Their Morphology")

Soil name, report number, horizon, and depth in inches	pH H_2O 1:1	Extractable cations Ca	Mg	K	Na	Total (TEC)	Cation-exchange capacity Sum of cations	Extract-able acidity	Hydrogen plus aluminum	Base saturation Ammonium acetate	Sum of cat-ions	Organic matter	Calci carbon equiva
		--------Milliequivalents per 100 grams of soil-------								Pct	Pct	Pct	Pct
Rowdy loam:													
(95KY-119-4)													
Ap---- 0 to 10	4.82	0.61	0.05	0.27	0.01	0.94	7.19	11.30	---	13	8	---	---
Bw1---10 to 16	4.73	0.40	0.07	0.25	0.08	0.80	6.73	8.42	---	12	9	---	---
Bw2---16 to 27	5.33	1.91	0.28	0.09	0.02	2.30	6.72	4.17	---	34	35	---	---
Summers very flaggy loam:													
(91KY-133-10)													
A----- 0 to 5	7.1	20.70	1.04	0.40	0.06	22.20	23.50	8.53	31.7	94	70	8.54	---
AB---- 5 to 10	5.4	6.46	1.24	0.27	0.04	8.01	16.90	4.32	20.9	47	38	1.93	---
Bw1---10 to 22	4.8	2.86	0.96	0.57	0.06	4.45	12.90	4.71	18.1	34	25	1.28	---
Bw2---22 to 32	4.9	4.04	1.30	0.68	0.19	6.21	14.70	4.71	22.8	42	27	3.11	---

Table 19.—Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Alticrest	Coarse-loamy, siliceous, mesic Typic Dystrochrepts
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Bledsoe	Fine, mixed, mesic Typic Hapludalfs
Caneyville	Fine, mixed, mesic Typic Hapludalfs
*Cloverlick	Loamy-skeletal, mixed, mesic Umbric Dystrochrepts
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Fairpoint	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Fedscreek	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Fiveblock	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Grigsby	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Guyandotte	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Handshoe	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Helechawa	Coarse-loamy, siliceous, mesic Typic Dystrochrepts
Highsplint	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Holly	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Itmann	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Jefferson	Fine-loamy, siliceous, mesic Typic Hapludults
Kaymine	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Kimper	Fine-loamy, mixed, mesic Umbric Dystrochrepts
Marrowbone	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Muse	Clayey, mixed, mesic Typic Hapludults
Ramsey	Loamy, siliceous, mesic Lithic Dystrochrepts
Rayne	Fine-loamy, mixed, mesic Typic Hapludults
Renox	Fine-loamy, mixed, mesic Ultic Hapludalfs
Rowdy	Fine-loamy, mixed, mesic Fluventic Dystrochrepts
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
Summers	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Udorthents	Udorthents
Varilla	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Wallen	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts

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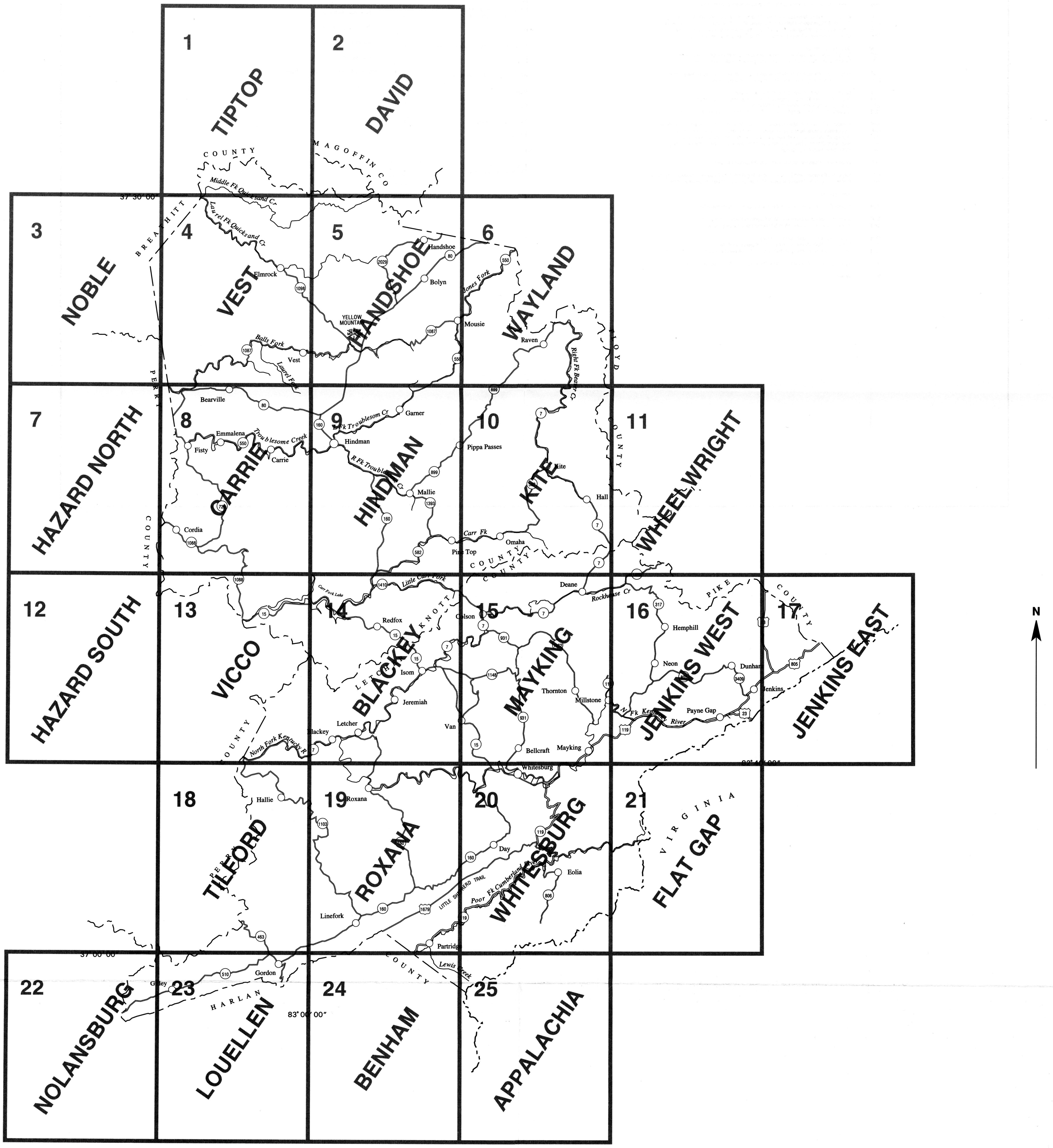


INDEX TO MAP SHEETS
KNOTT and LETCHER COUNTIES, KENTUCKY

Scale 1:190080

MILES

KILOMETERS

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

KNOTT AND LETCHER COUNTIES, KENTUCKY

KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET, DIVISION OF CONSERVATION
KENTUCKY AGRICULTURAL EXPERIMENT STATION; UNITED STATES DEPARTMENT OF AGRICULTURE, FOREST SERVICE
KNOTT COUNTY CONSERVATION DISTRICT, LETCHER COUNTY CONSERVATION DISTRICT

SOIL LEGEND

Map unit symbols and names are listed in alphabetical order. Map symbols consist of one to three letters. The first letter is capitalized and is the first letter of the soil series name (r the name of the higher classification or miscellaneous area). The second letter is lowercase. The third letter is capitalized and indicates the class of slope. Symbols without a slope letter are for nearly level soils or for miscellaneous areas.

SYMBOL	NAME
AlC	Allegheny loam, 2 to 15 percent slopes
AtF	Alticrest-Ramsey-Wallen complex, 20 to 55 percent slopes, rocky
BcG	Berks-Caneyville complex, 50 to 120 percent slopes, very rocky
CbF	Caneyville-Renox-Bledsoe complex, 50 to 80 percent slopes, extremely stony
CgF	Cloverlick-Guyandotte-Highsplint complex, 35 to 75 percent slopes, very stony
CkF	Cloverlick-Kimper-Highsplint complex, 30 to 65 percent slopes, very stony
CsF	Cloverlick-Shelocta-Kimper complex, 20 to 70 percent slopes, stony
DAM	Dam, large earthen
DgF	Dekalb-Gilpin-Marrowbone complex, 20 to 80 percent slopes, very rocky
DrF	Dekalb-Gilpin-Rayne complex, 25 to 65 percent slopes, very rocky
FaF	Fedscreek-Shelocta-Handshoe complex, 30 to 80 percent slopes, very stony
FkE	Fiveblock and Kaymine soils, 0 to 30 percent slopes, stony
GlD	Gilpin-Shelocta complex, 12 to 25 percent slopes
GmF	Gilpin-Summers-Kimper complex, 20 to 55 percent slopes, very stony
Gr	Grigsby sandy loam, occasionally flooded
GuB	Grigsby-Urban land complex, 0 to 6 percent slopes, occasionally flooded
HaF	Handshoe-Fedscreek-Marrowbone complex, 30 to 80 percent slopes, very stony
HeF	Helechawa-Varilla-Jefferson complex, 35 to 75 percent slopes, very rocky
HsF	Highsplint-Shelocta-Dekalb complex, 35 to 80 percent slopes, very stony
HtF	Highsplint-Shelocta-Muse complex, 30 to 80 percent slopes, extremely stony
Hy	Holly loam, frequently flooded
ImF	Itmann very channery sandy loam, 4 to 80 percent slopes
KfF	Kaymine, Fairpoint, and Fiveblock soils, benched, 2 to 70 percent slopes, very stony
KrF	Kimper-Cloverlick-Renox complex, 30 to 80 percent slopes, extremely stony
Pt	Pits, quarries
RgB	Rowdy-Grigsby complex, 0 to 4 percent slopes, occasionally flooded
ShF	Shelocta-Highsplint complex, 30 to 65 percent slopes, very stony
SmF	Shelocta-Muse complex, 15 to 50 percent slopes, very stony
UdE	Udorthents-Urban land complex, steep
UrC	Urban land-Udorthents complex, 0 to 15 percent slopes
UuB	Urban land-Udorthents-Grigsby complex, 0 to 6 percent slopes, rarely flooded
VaF	Varilla-Jefferson-Alticrest complex, 35 to 75 percent slopes, very rocky
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

ROADS

- Divided (median shown if scale permits) (emblem only)
- Other roads (emblem only)

ROAD EMBLEM & DESIGNATIONS

- Federal — 287
- State — 52
- County, farm or ranch — 1283

RAILROAD (label only)

DAMS

- Medium or Small (Named where applicable) — water; w

MISCELLANEOUS CULTURAL FEATURES

- Church
- School

WATER FEATURES

DRAINAGE

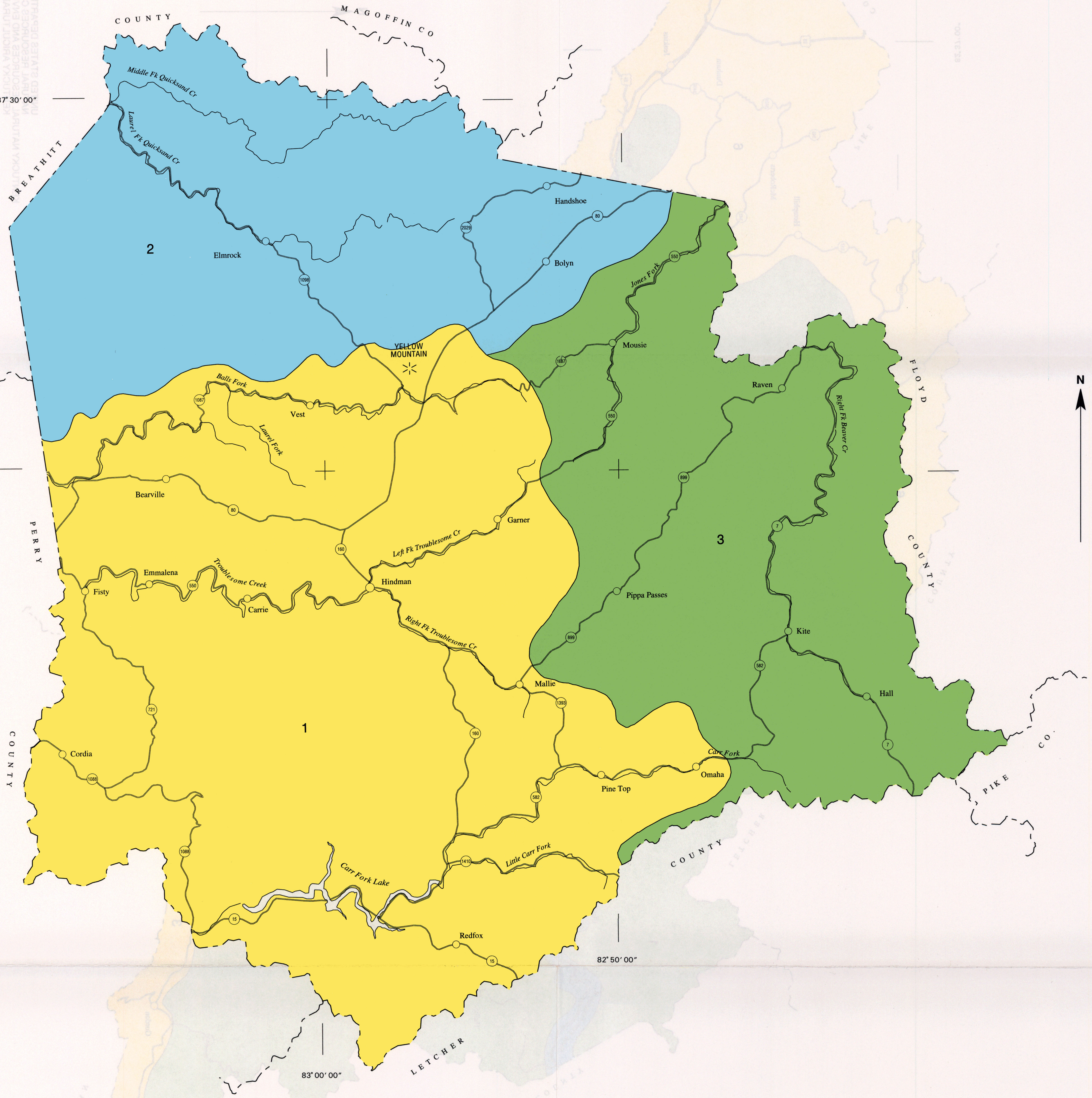
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

MISCELLANEOUS WATER FEATURES

- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — GuB RgB



SOIL LEGEND*

1	SHELOCTA-HIGHSPLINT-CLOVERLICK-KIMPER
2	HANDSHOE-CLOVERLICK-FEDSCREEK-MARROWBONE
3	SHELOCTA-CLOVERLICK-FEDSCREEK-KIMPER

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1998

Each area outlined on this map consists of more than one kind of soil. The map is meant for general planning rather than a basis for decisions on the use of specific tracts.

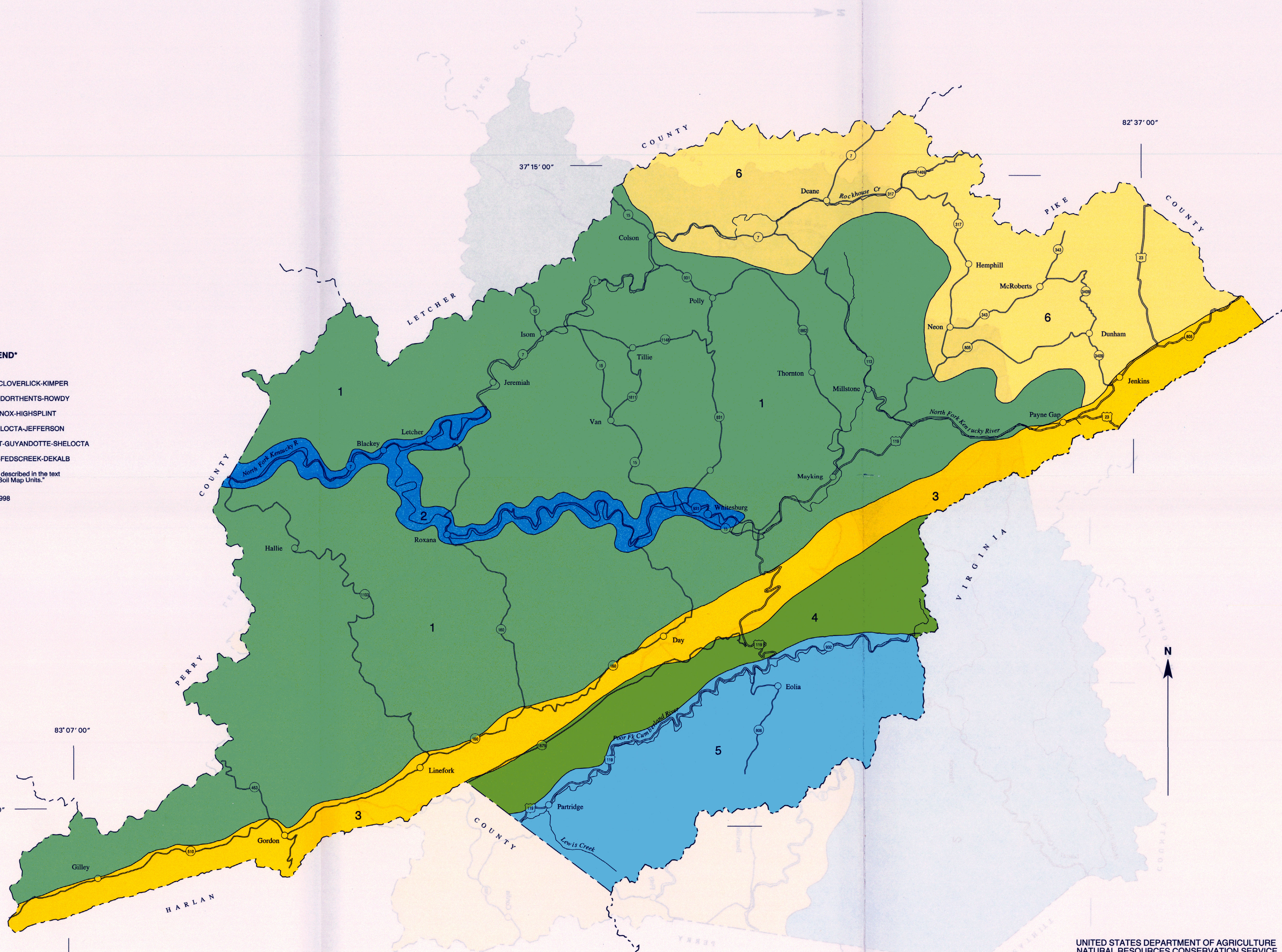
UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY ARICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
KNOTT COUNTY, KENTUCKY

Scale 1:100000

MILES

KILOMETERS



SOIL LEGEND*

1	SHELOCTA-HIGHSPLINT-CLOVERLICK-KIMPER
2	GRIGSBY-URBAN LAND-UDORTHENTS-ROWDY
3	KIMPER-CLOVERLICK-RENOX-HIGHSPLINT
4	ALTICREST-VARILLA-SHELOCTA-JEFFERSON
5	CLOVERLICK-HIGHSPLINT-GUYANDOTTE-SHELOCTA
6	SHELOCTA-CLOVERLICK-FEDSCREEK-DEKALB

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1998

Each area outlined on this map consists of more than one kind of soil. The map is meant for general planning rather than a basis for decisions on the use of specific tracts.

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY ARICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

LETCHER COUNTY, KENTUCKY

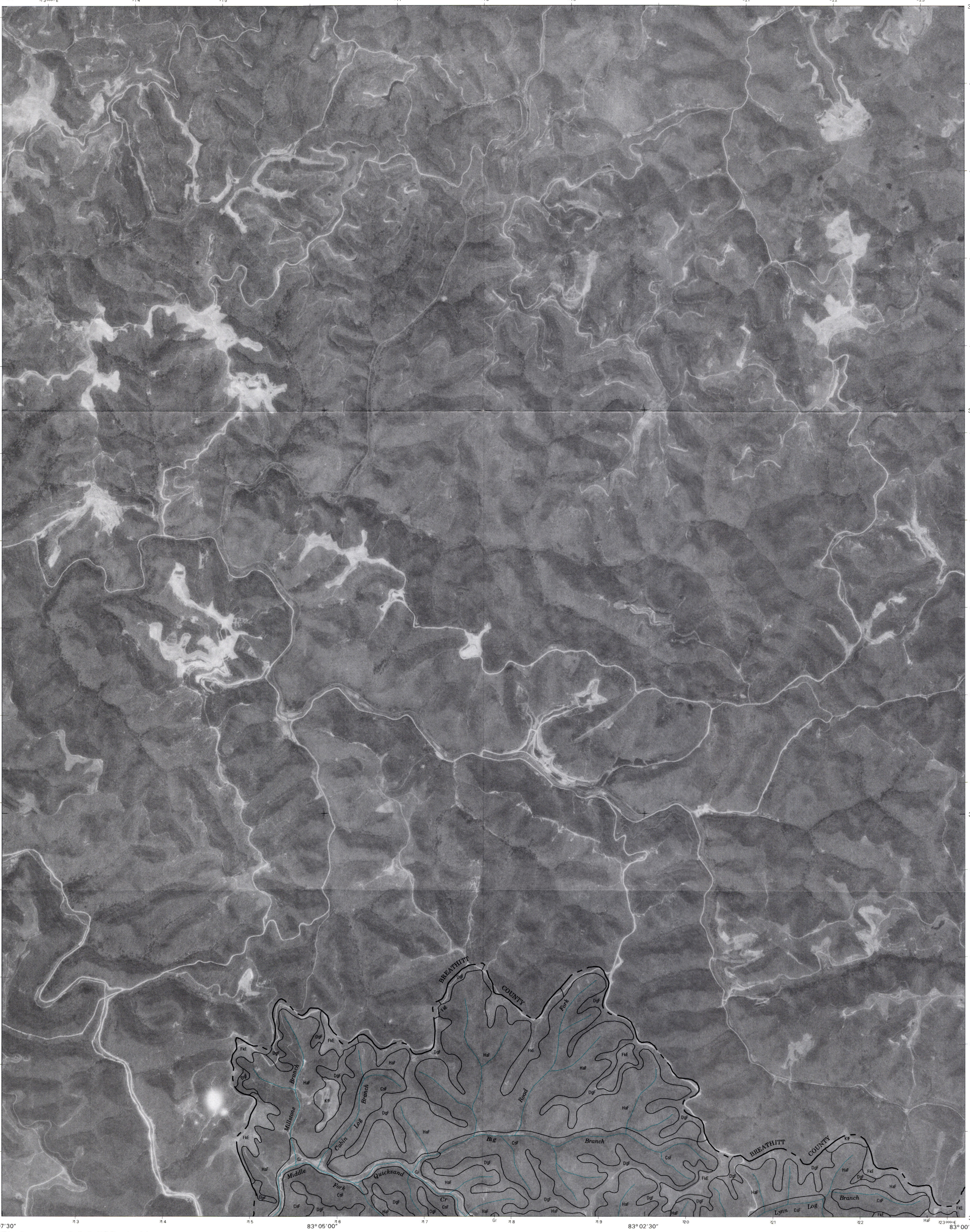
Scale 1:100000

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

83° 07′30″ | 83° 05′00″ | 83° 02′30″ | 83° 00′00″

37° 37′30″



37° 35′00″

37° 32′30″

37° 30′00″

83° 07′30″ | 83° 05′00″ | 83° 02′30″ | 83° 00′00″

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1983-1985 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery. Soils data were obtained from SSURGO.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

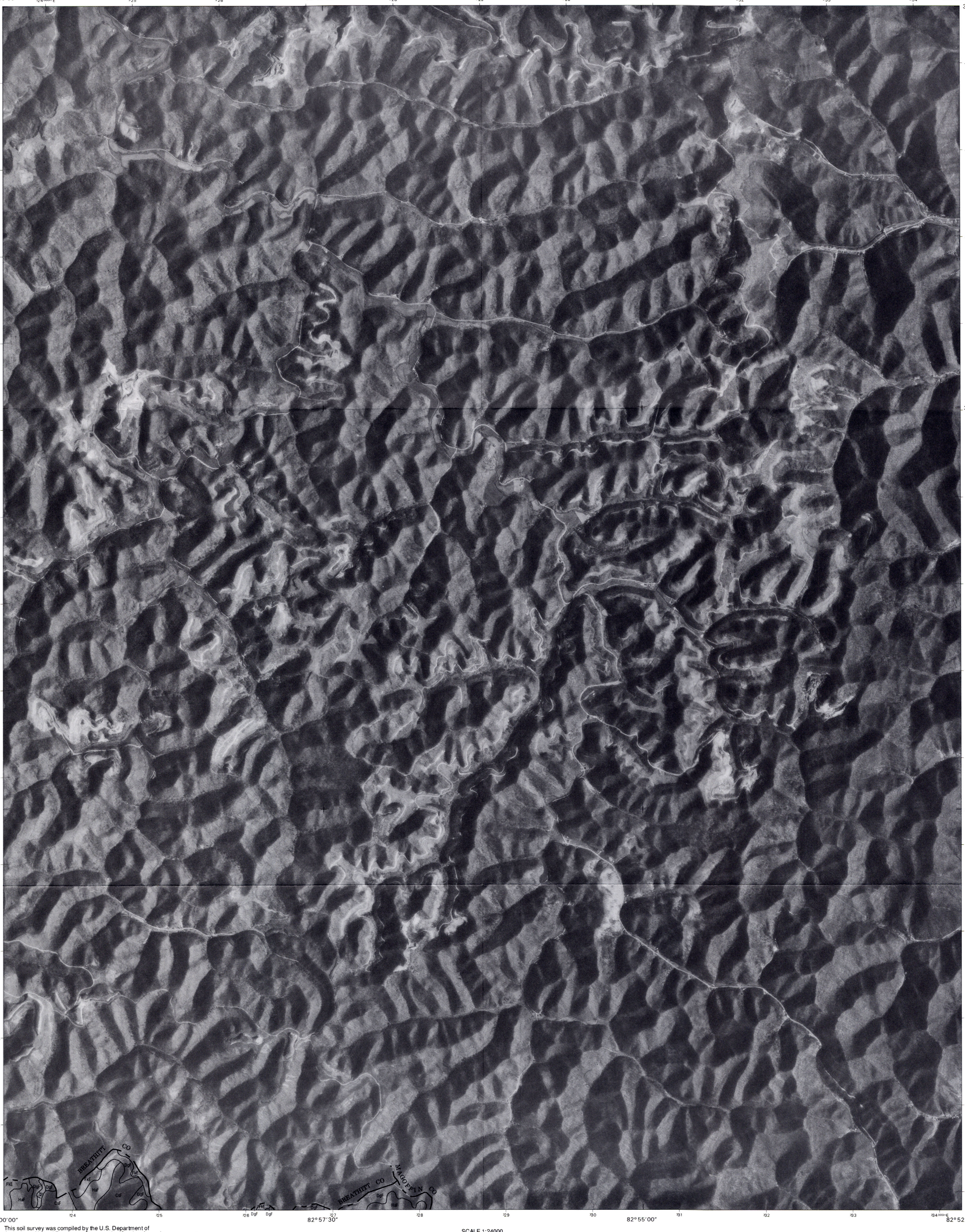
1 SEITZ
2 SALYERSVILLE SOUTH
3 IVYTON
4 GUAGE
5 DAVID
6 NOBLE
7 VEST
8 HANDSHOE

INDEX TO ADJOINING 7.5 MAPS

TIPTOP, KENTUCKY

7.5 MINUTE SERIES
SHEET NUMBER 1 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

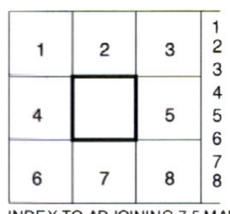
NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS



QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 SALYERSVILLE SOUTH
2 IVYTON
3 PRESTONSBURG
4 TIPTOP
5 MARTIN
6 VEST
7 HANDSHOE
8 WAYLAND

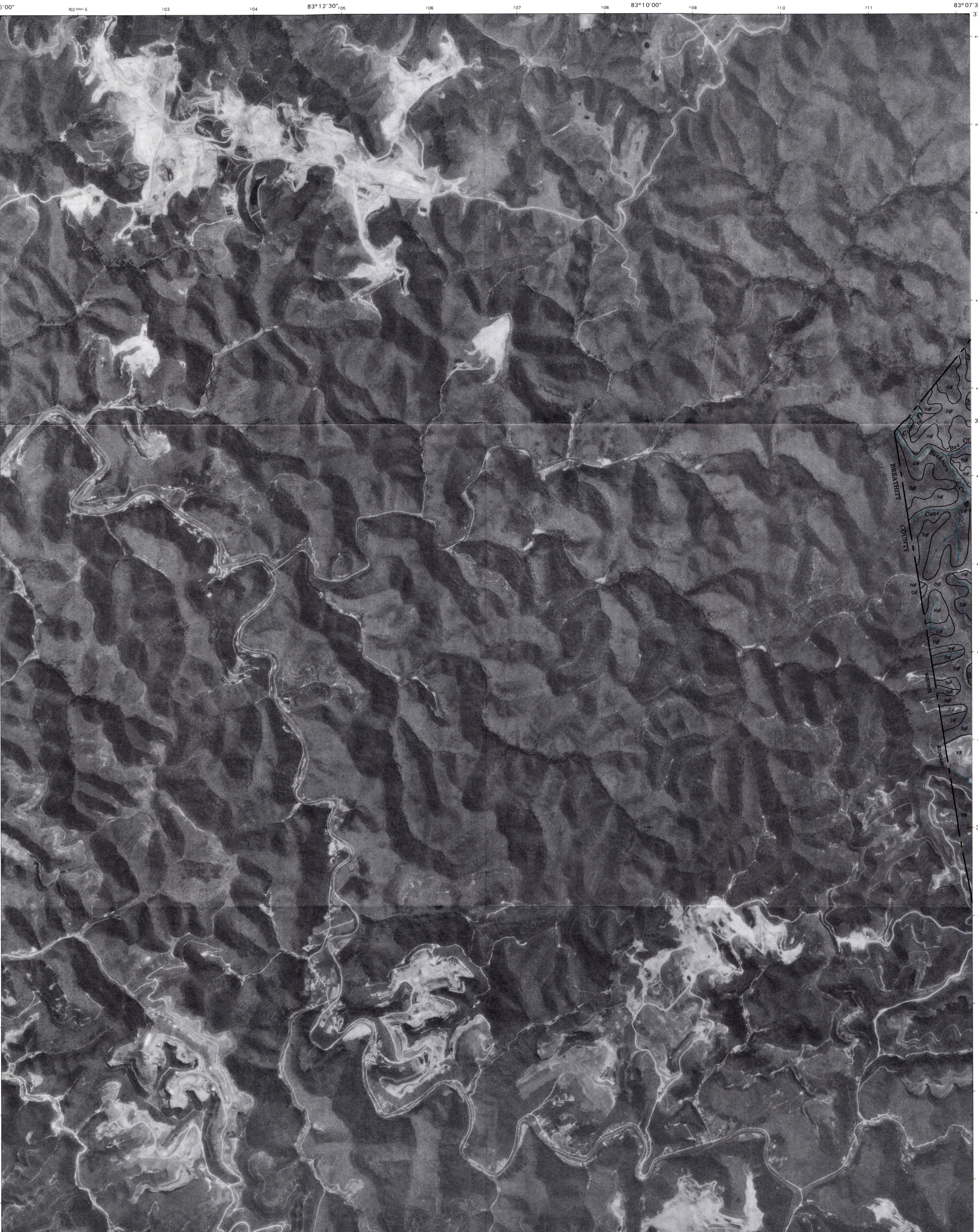
INDEX TO ADJOINING 7.5 MAPS

DAVID, KENTUCKY

7.5 MINUTE SERIES
SHEET NUMBER 2 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

83°15'00" 83°12'30" 83°10'00" 83°07'30"
37°30'00" 37°30'00"



37°22'30" 37°22'30"
83°15'00" 83°12'30" 83°10'00" 83°07'30"

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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

NOBLE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 25

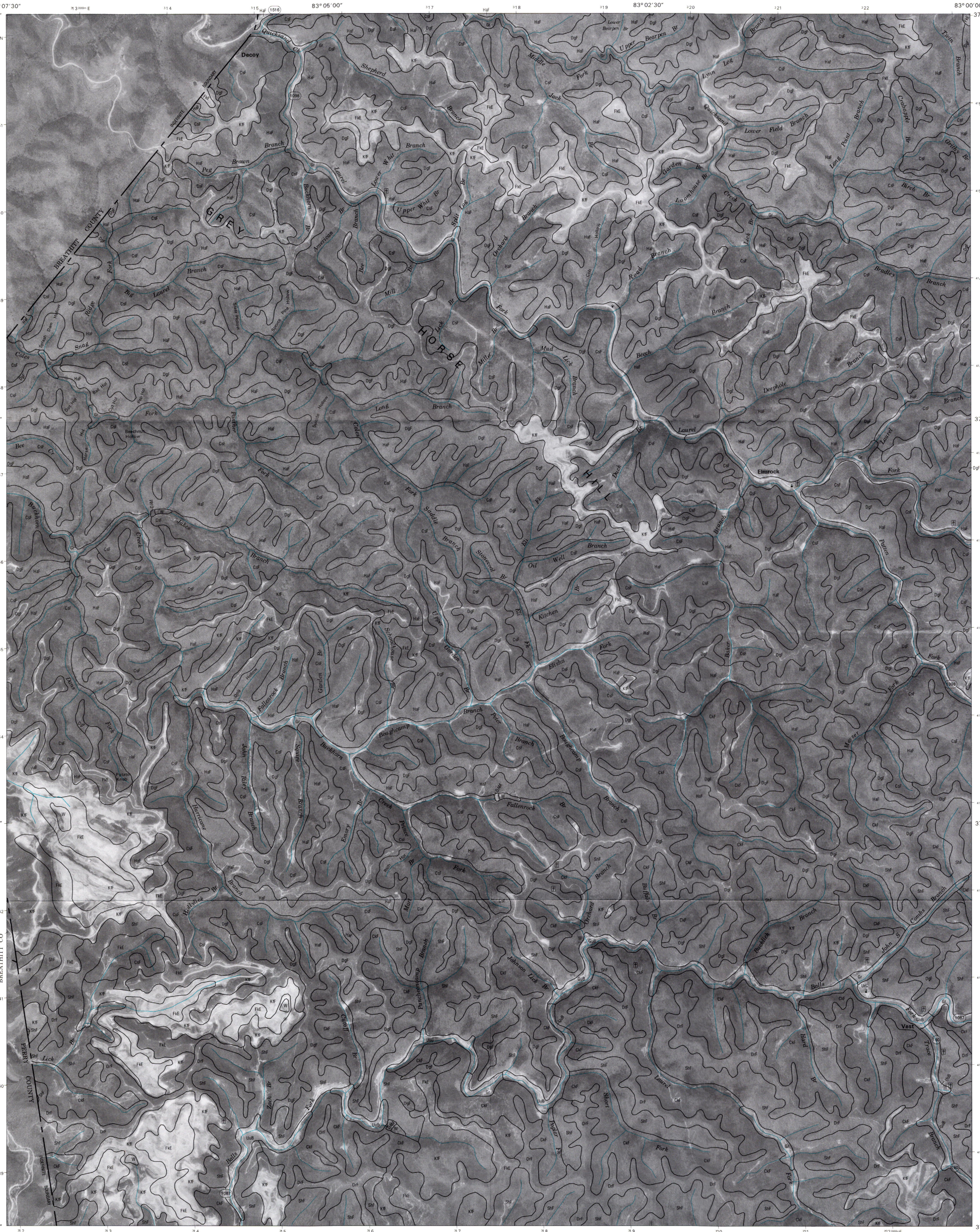
1	2	3
4		5
6	7	8

1 QUICKSAND
2 GUAGE
3 TIPTOP
4 HADDIX
5 VEST
6 KRYPTON
7 HAZARD NORTH
8 CARRIE

INDEX TO ADJOINING 7.5 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

KNOTT AND LETCHER COUNTIES, KENTUCKY
VEST QUADRANGLE
SHEET NUMBER 4 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

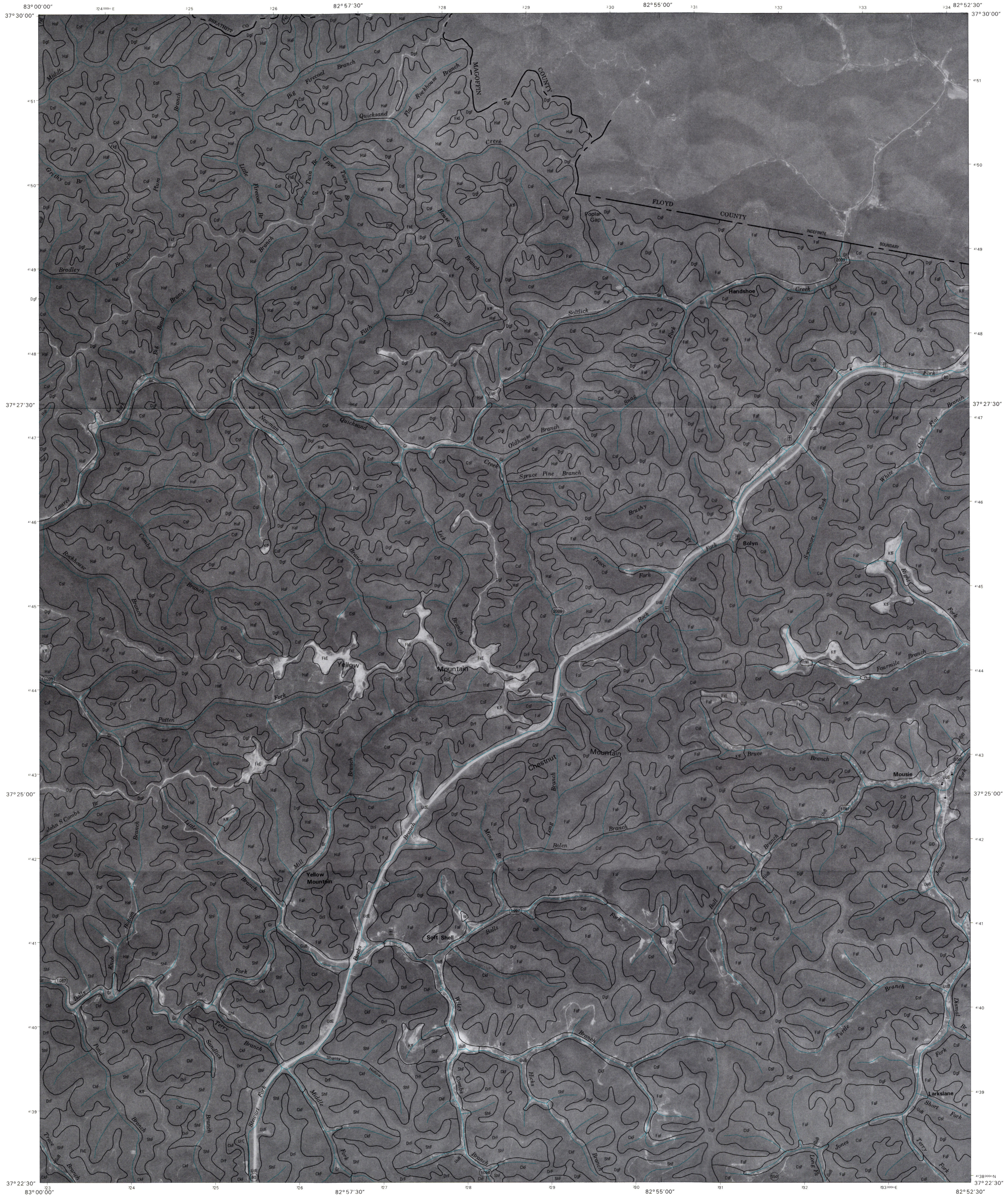
QUADRANGLE LOCATION

1	2	3	1 GUAGE
4		5	2 TIPTOP
6	7	8	3 DAVID

4 NOBLE
5 HANDSHOE
6 HAZARD NORTH
7 CARRIE
8 HINDMAN

INDEX TO ADJOINING 7.5 MAPS

VEST, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

1	2	3	1 TIPTOP 2 DAVID 3 MARTIN
4		5	4 VEST 5 WAYLAND 6 CARRIE
6	7	8	7 HINDMAN 8 KITE

INDEX TO ADJOINING 7.5 MAPS

HANDSHOE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

KNOTT AND LETCHER COUNTIES, KENTUCKY
WAYLAND QUADRANGLE
SHEET NUMBER 6 OF 25

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1983-1985 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery. Soils data were obtained from SSURGO.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES 1 0 1

FEET 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS 1 0 1

KNOTT AND LETCHER COUNTIES, KENTUCKY NO. 6

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

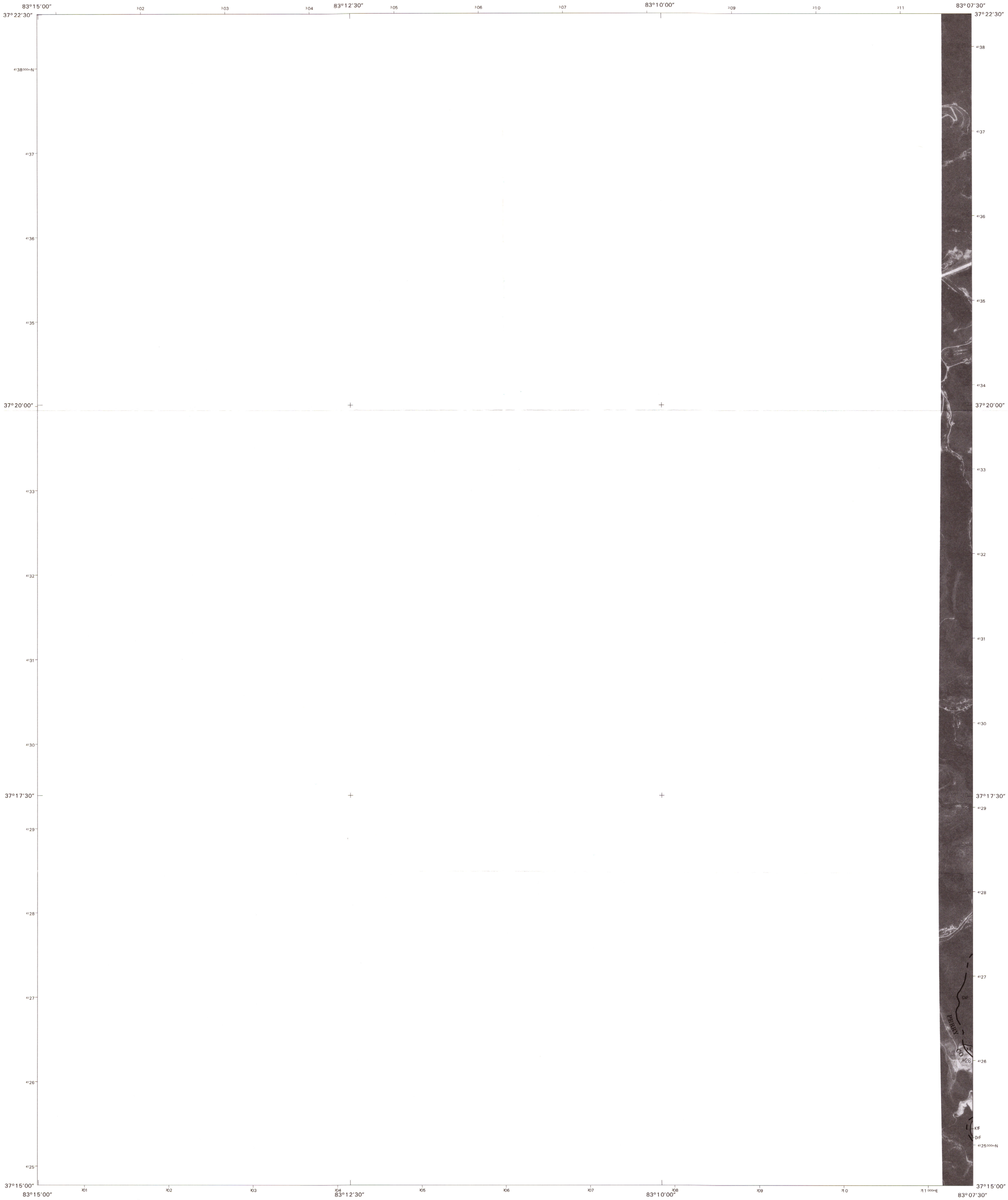
1 DAVID
2 MARTIN
3 HAROLD
4 HANDSHOE
5 MCDOWELL
6 HINDMAN
7 KITE
8 WHEELWRIGHT

INDEX TO ADJOINING 7.5 MAPS

WAYLAND, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

KNOTT AND LETCHER COUNTIES, KENTUCKY
HAZARD NORTH QUADRANGLE
SHEET NUMBER 7 OF 25



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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 HADDIX
2 NOBLE
3 VEST
4 KRYPTON
5 CARRIE
6 HYDEN EAST
7 HAZARD SOUTH
8 VICCO

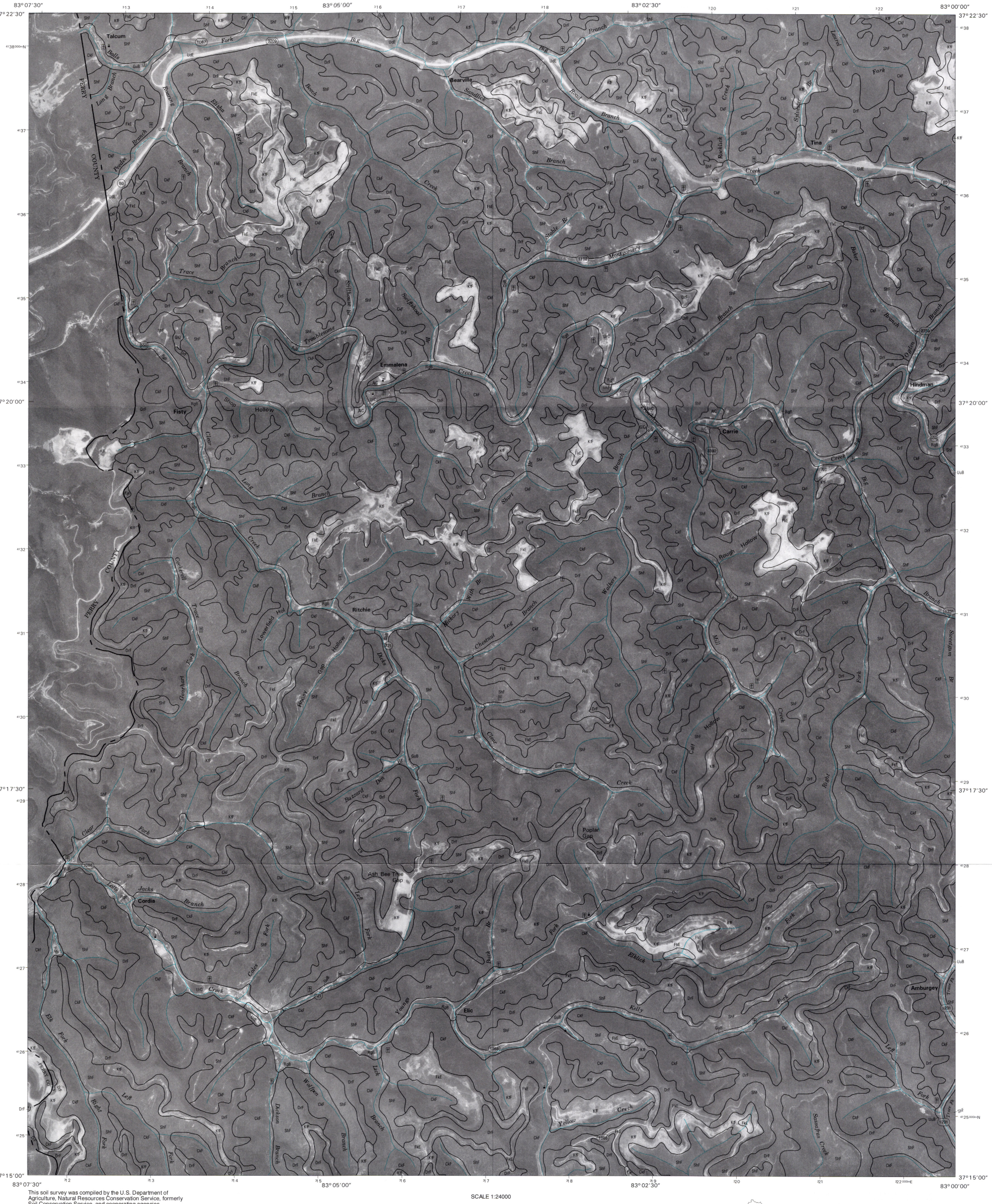
INDEX TO ADJOINING 7.5 MAPS

HAZARD NORTH, KENTUCKY

7.5 MINUTE SERIES
SHEET NUMBER 7 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

KNOTT AND LETCHER COUNTIES, KENTUCKY
CARRIE QUADRANGLE
SHEET NUMBER 8 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3	1 NOBLE 2 VEST 3 HANDSHOE
4		5	4 HAZARD NORTH 5 HINDMAN 6 HAZARD SOUTH
6	7	8	7 VICCO 8 BLACKEY

INDEX TO ADJOINING 7.5 MAPS

CARRIE, KENTUCKY

7.5 MINUTE SERIES
SHEET NUMBER 8 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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NORTH

SCALE 1:24000

MILES

FEET

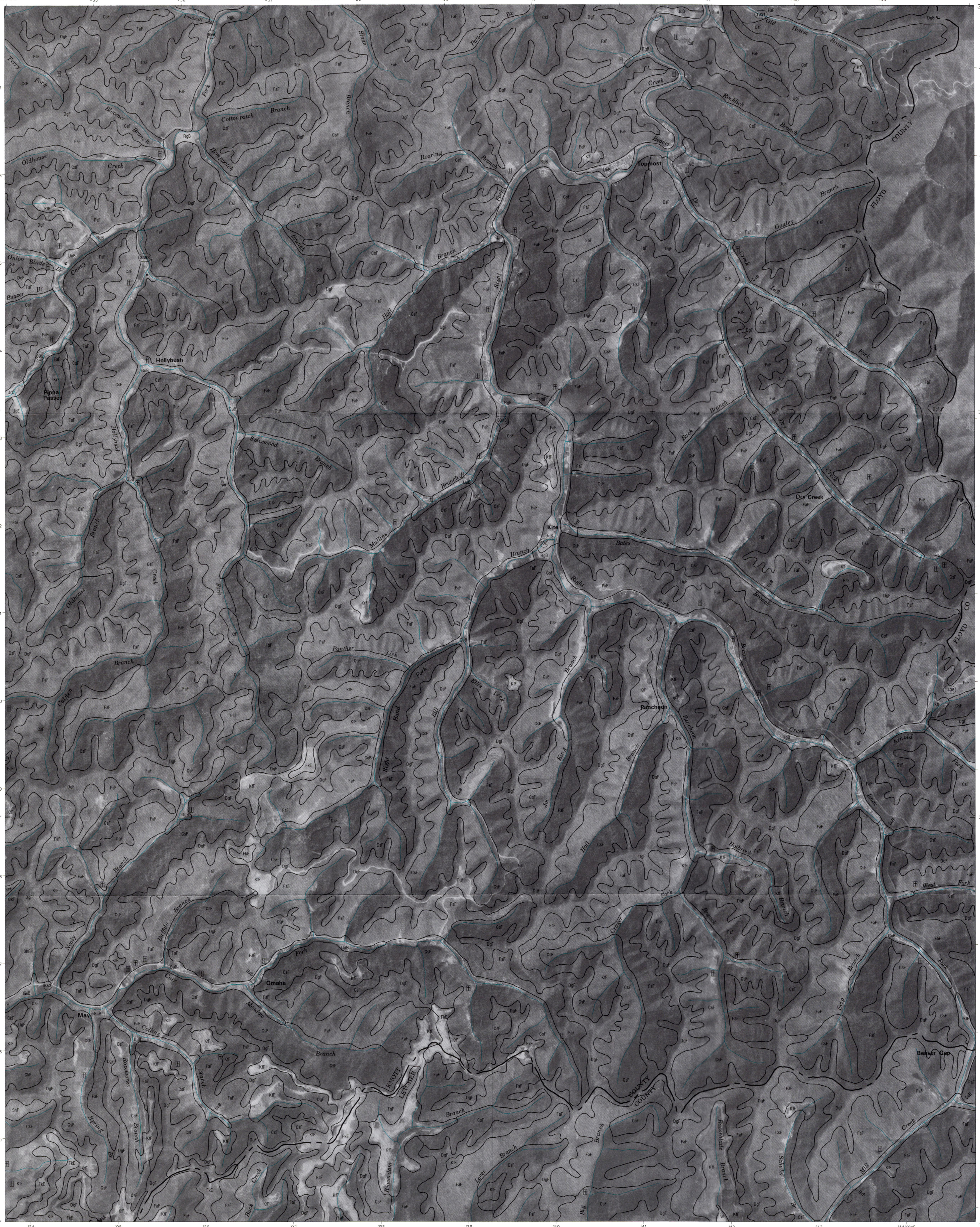
KILOMETERS

QUADRANGLE LOCATION

1	2	3	1 VEST 2 HANDSHOE 3 WAYLAND
4		5	4 CARRIE 5 KITE 6 VICCO
6	7	8	7 BLACKEY 8 MAYKING

INDEX TO ADJOINING 7.5 MAPS

HINDMAN, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 HANDSHOE
2 WAYLAND
3 MCDOWELL
4 HINDMAN
5 WHEELWRIGHT
6 BLACKEY
7 MAYKING
8 JENKINS WEST

INDEX TO ADJOINING 7.5 MAPS

KITE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 25

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1983-1985 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery. Soils data were obtained from SSURGO.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3	1 WAYLAND 2 MCDOWELL 3 PIKEVILLE
4		5	4 KITE 5 DORTON 6 MAYKING
6	7	8	7 JENKINS WEST 8 JENKINS EAST

INDEX TO ADJOINING 7.5 MAPS

WHEELWRIGHT, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

KNOTT AND LETCHER COUNTIES, KENTUCKY
HAZARD SOUTH QUADRANGLE
SHEET NUMBER 12 OF 25

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1983-1985 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery. Soils data were obtained from SSURGO.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

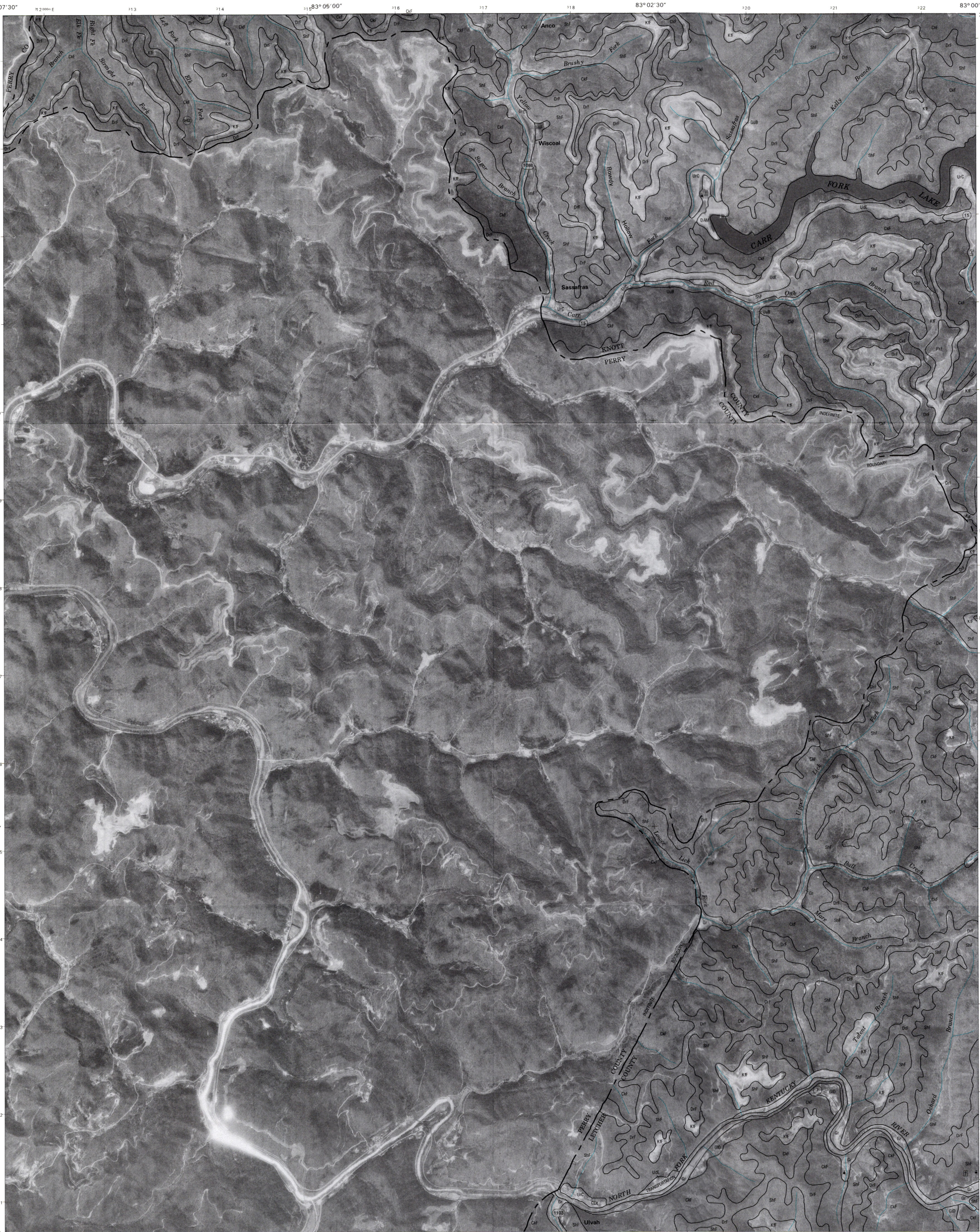
1	2	3
4		5
6	7	8

1 KRYPTON
2 HAZARD NORTH
3 CARRIE
4 HYDEN EAST
5 VICCO
6 CUTSHIN
7 LEATHERWOOD
8 TILFORD

INDEX TO ADJOINING 7.5 MAPS

HAZARD SOUTH, KENTUCKY

7.5 MINUTE SERIES
SHEET NUMBER 12 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

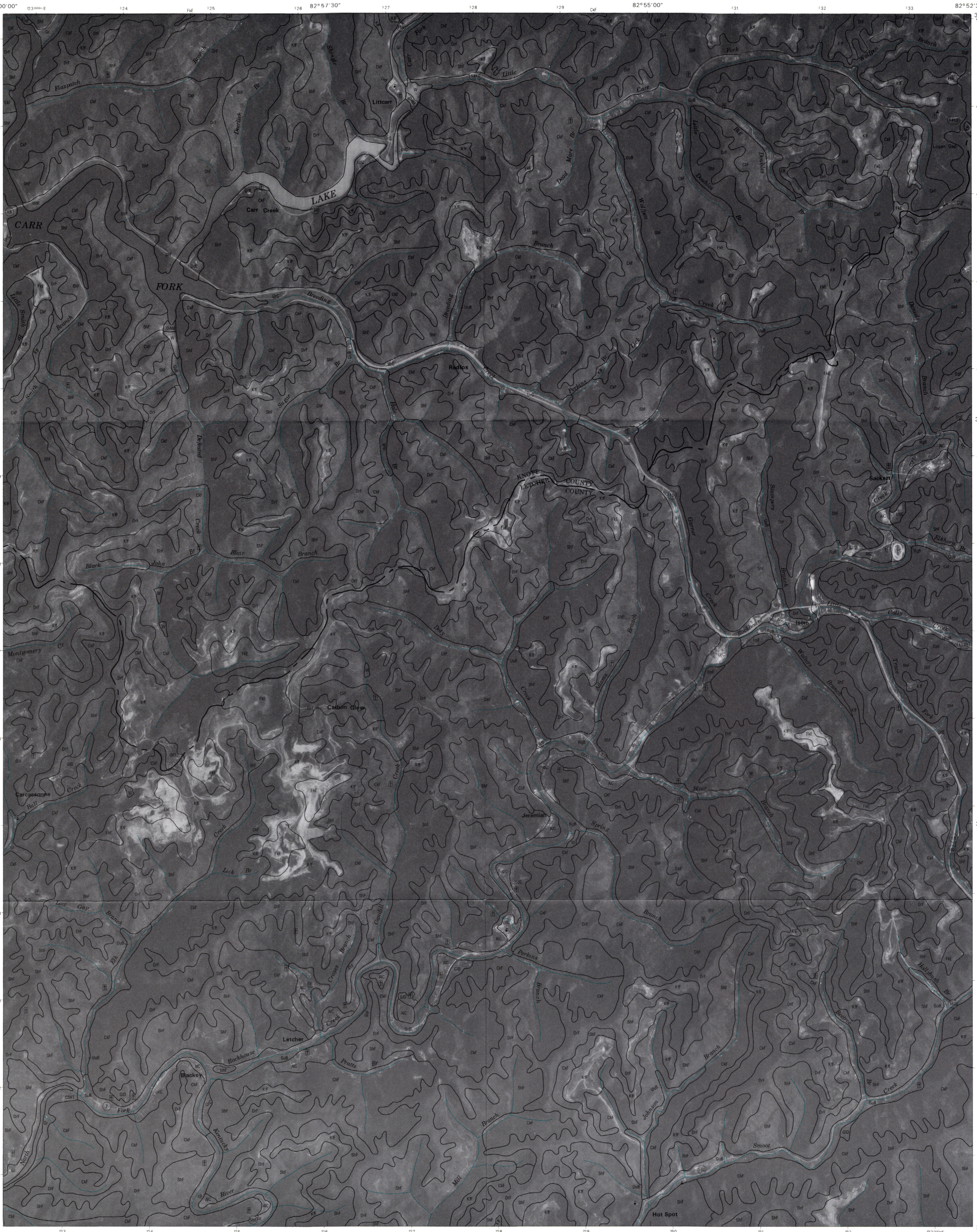
KILOMETERS

QUADRANGLE LOCATION

1 HAZARD NORTH
2 CARRIE
3 HINDMAN
4 HAZARD SOUTH
5 BLACKEY
6 LEATHERWOOD
7 TILFORD
8 ROXANA

INDEX TO ADJOINING 7.5 MAPS

VICCO, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

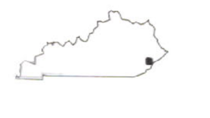
SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

KNOTT AND LETCHER COUNTIES, KENTUCKY NO. 14



QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 CARRIE
2 HINDMAN
3 KITE
4 VICCO
5 MAYKING
6 TILFORD
7 ROXANA
8 WHITESBURG

INDEX TO ADJOINING 7.5 MAPS

BLACKEY, KENTUCKY

7.5 MINUTE SERIES
SHEET NUMBER 14 OF 25

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1983-1985 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery. Soils data were obtained from SSURGO.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

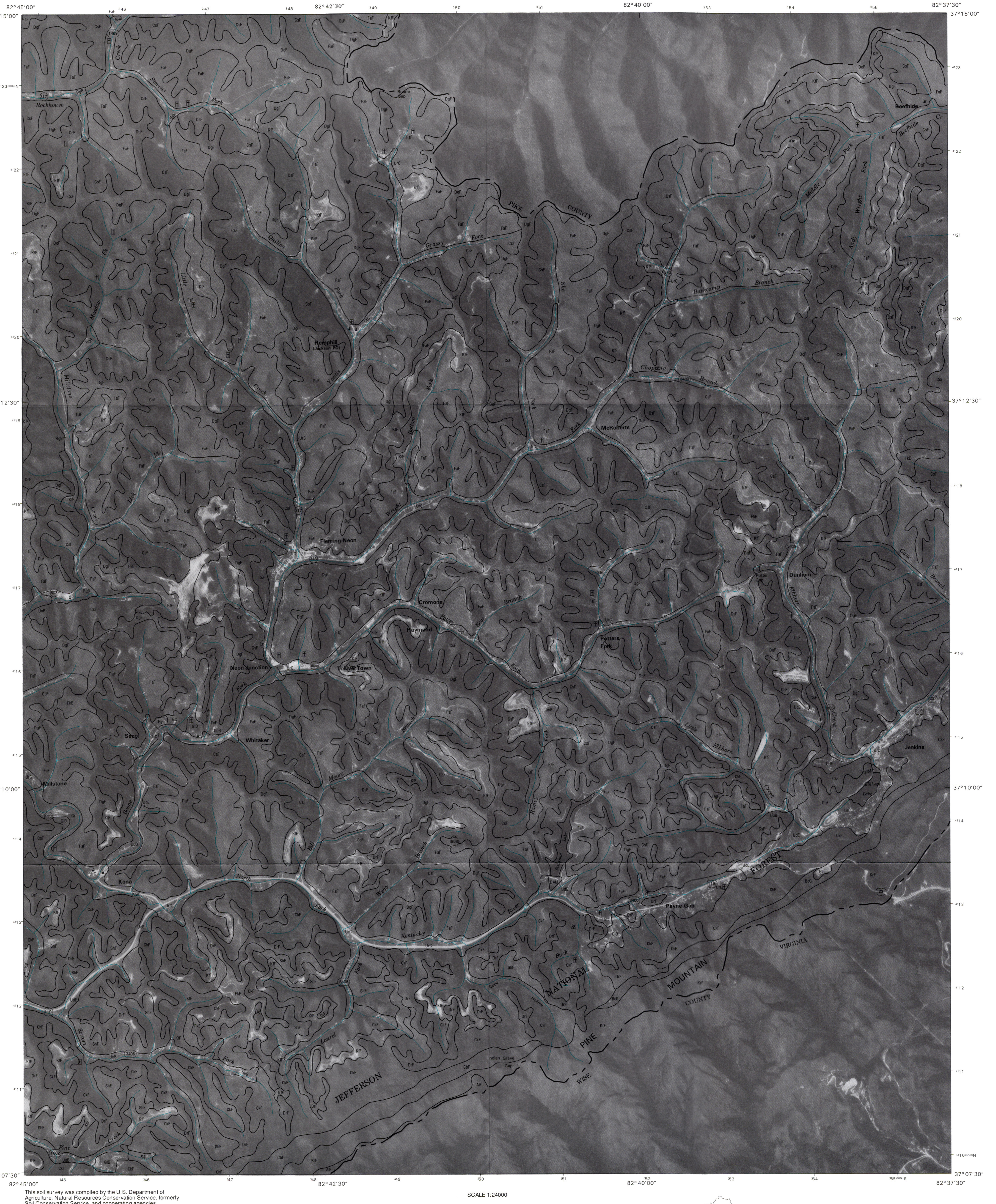
1	2	3
4		5
6	7	8

1 HINDMAN
2 KITE
3 WHEELWRIGHT
4 BLACKEY
5 JENKINS WEST
6 ROXANA
7 WHITESBURG
8 FLAT GAP

INDEX TO ADJOINING 7.5 MAPS

MAYKING, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 15 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

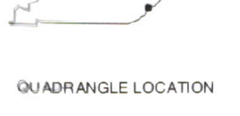
NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS



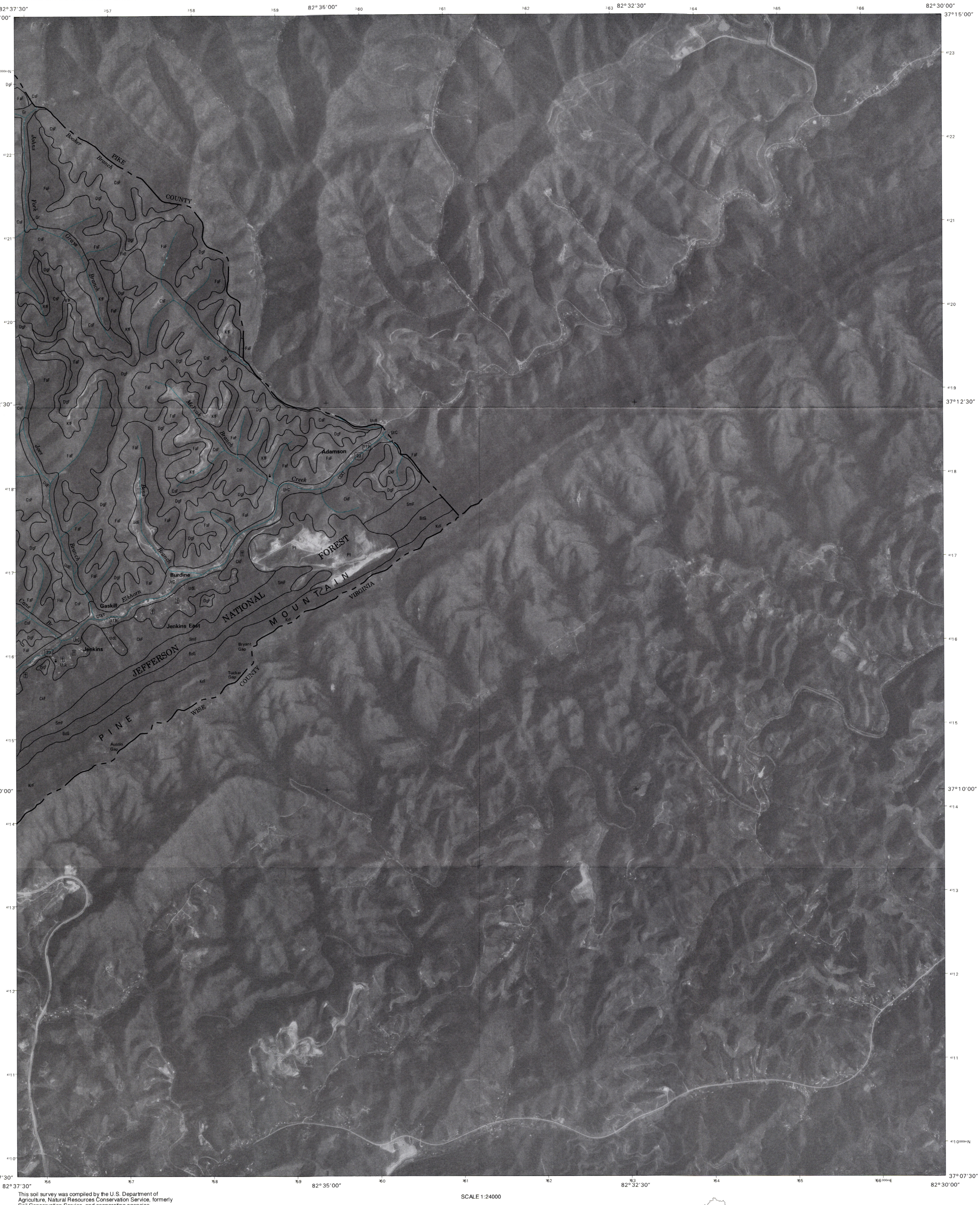
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 KITE
2 WHEELWRIGHT
3 DORTON
4 MAYKING
5 JENKINS EAST
6 WHITESBURG
7 FLAT GAP
8 POUND

INDEX TO ADJOINING 7.5 MAPS

JENKINS WEST, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 16 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

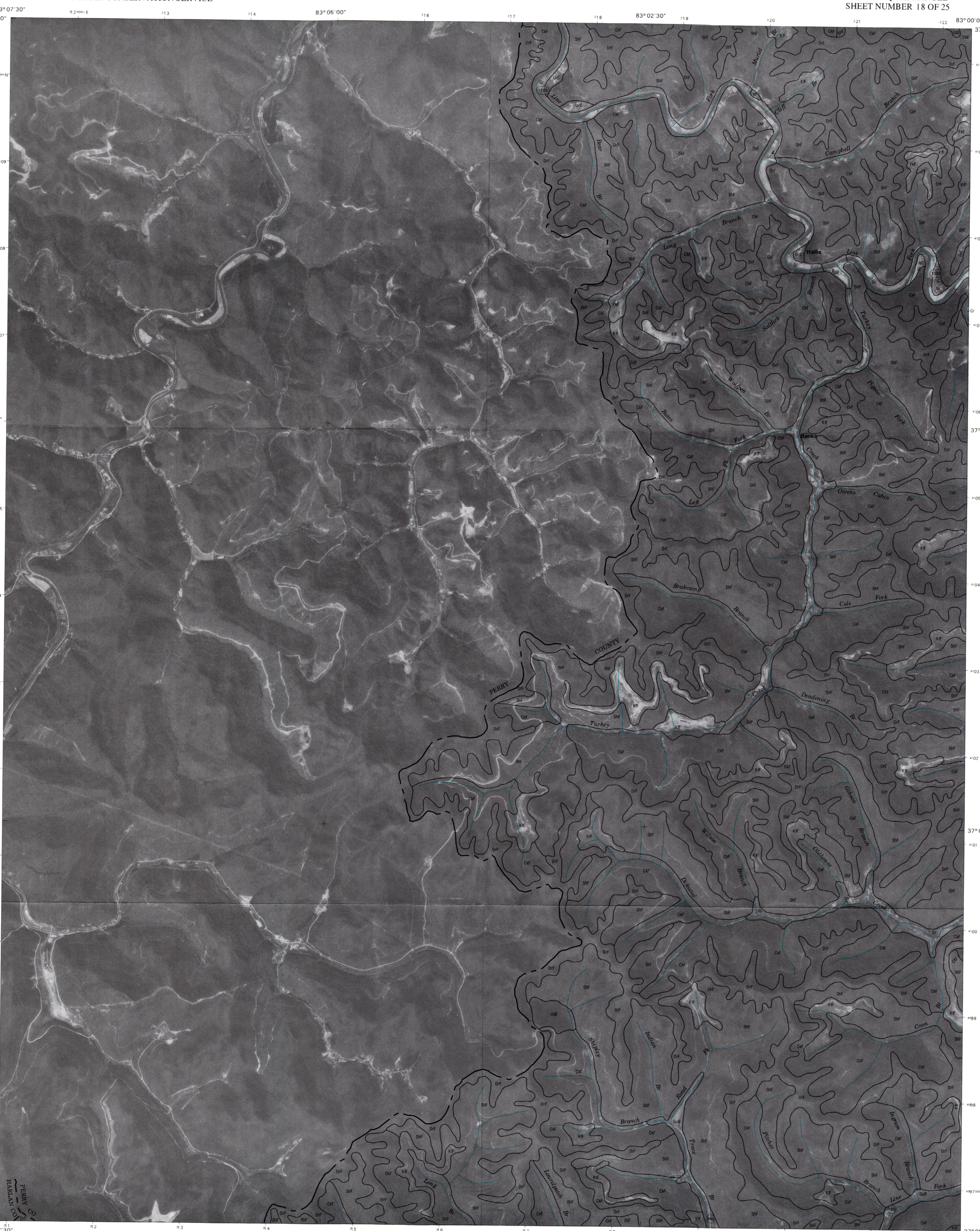
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 WHEELWRIGHT
2 DORTON
3 HELLIER
4 JENKINS WEST
5 CLINTWOOD
6 FLAT GAP
7 POUND
8 CANEY RIDGE

INDEX TO ADJOINING 7.5 MAPS

JENKINS EAST, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 17 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 ½ 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 HAZARD SOUTH
2 VICCO
3 BLACKEY
4 LEATHERWOOD
5 ROXANA
6 NOLANSBURG
7 LOUELLEN
8 BENHAM

INDEX TO ADJOINING 7.5 MAPS

TILFORD, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 25

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1983-1985 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery. Soils data were obtained from SSURGO.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

KNOTT AND LETCHER COUNTIES, KENTUCKY NO. 19

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 VICCO
2 BLACKEY
3 MAYKING
4 TILFORD
5 WHITESBURG
6 LOUELLEN
7 BENHAM
8 APPALACHIA

INDEX TO ADJOINING 7.5 MAPS

ROXANA, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 19 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

KNOTT AND LETCHER COUNTIES, KENTUCKY
WHITESBURG QUADRANGLE
SHEET NUMBER 20 OF 25

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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

KNOTT AND LETCHER COUNTIES, KENTUCKY NO. 20

QUADRANGLE LOCATION

WHITESBURG, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 20 OF 25

1	2	3
4		5
6	7	8

1 BLACKEY
2 MAYKING
3 JENKINS WEST
4 ROXANA
5 FLAT GAP
6 BENHAM
7 APPALACHIA
8 NORTON

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

KNOTT AND LETCHER COUNTIES, KENTUCKY NO. 21

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 MAYKING
2 JENKINS WEST
3 JENKINS EAST
4 WHITESBURG
5 POUND 186-SE
6 APPALACHIA 178-NE
7 NORTON 187-NW
8 WISE 187-NE

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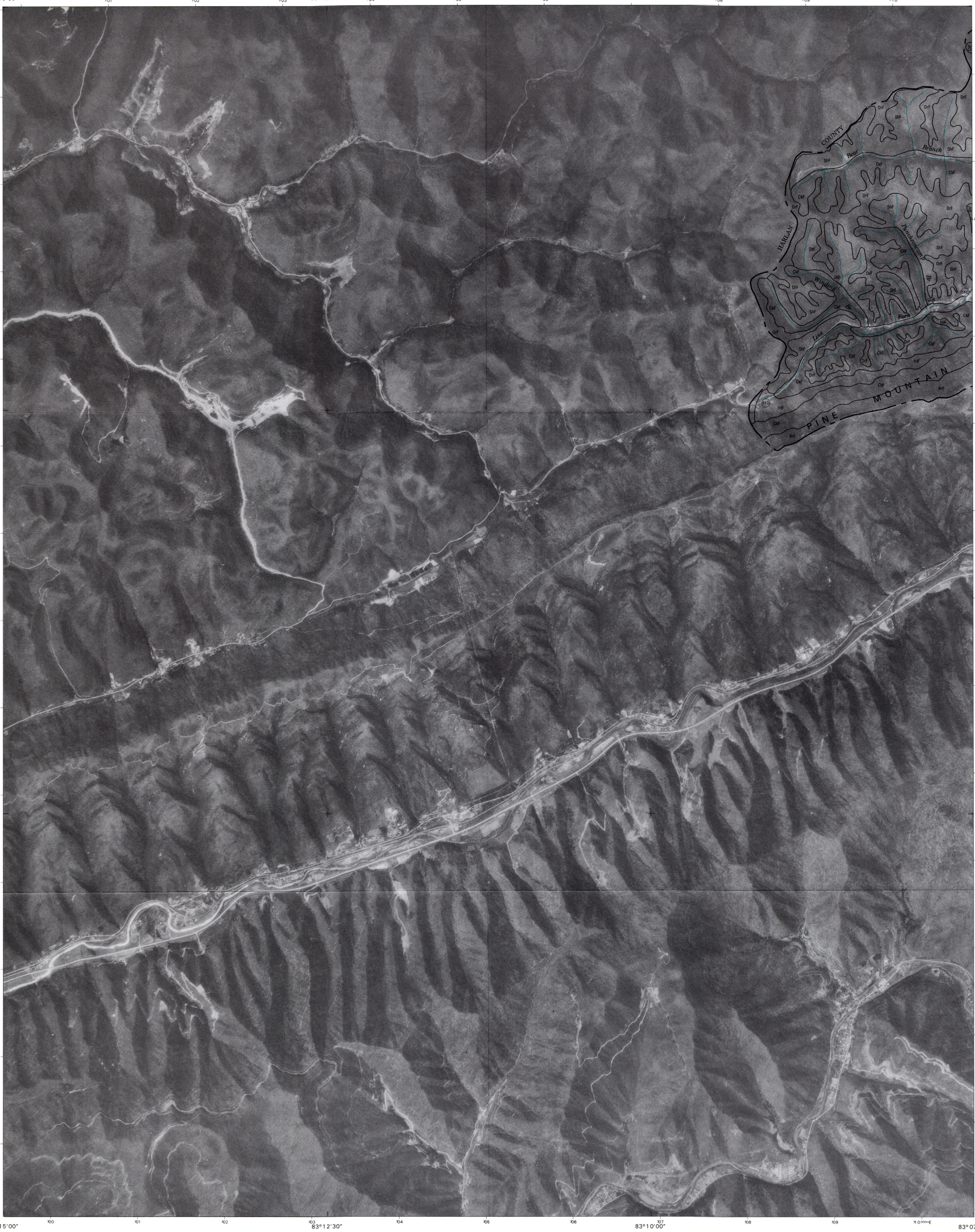
FLAT GAP, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 21 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

KNOTT AND LETCHER COUNTIES, KENTUCKY
NOLANSBURG QUADRANGLE
SHEET NUMBER 22 OF 25



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

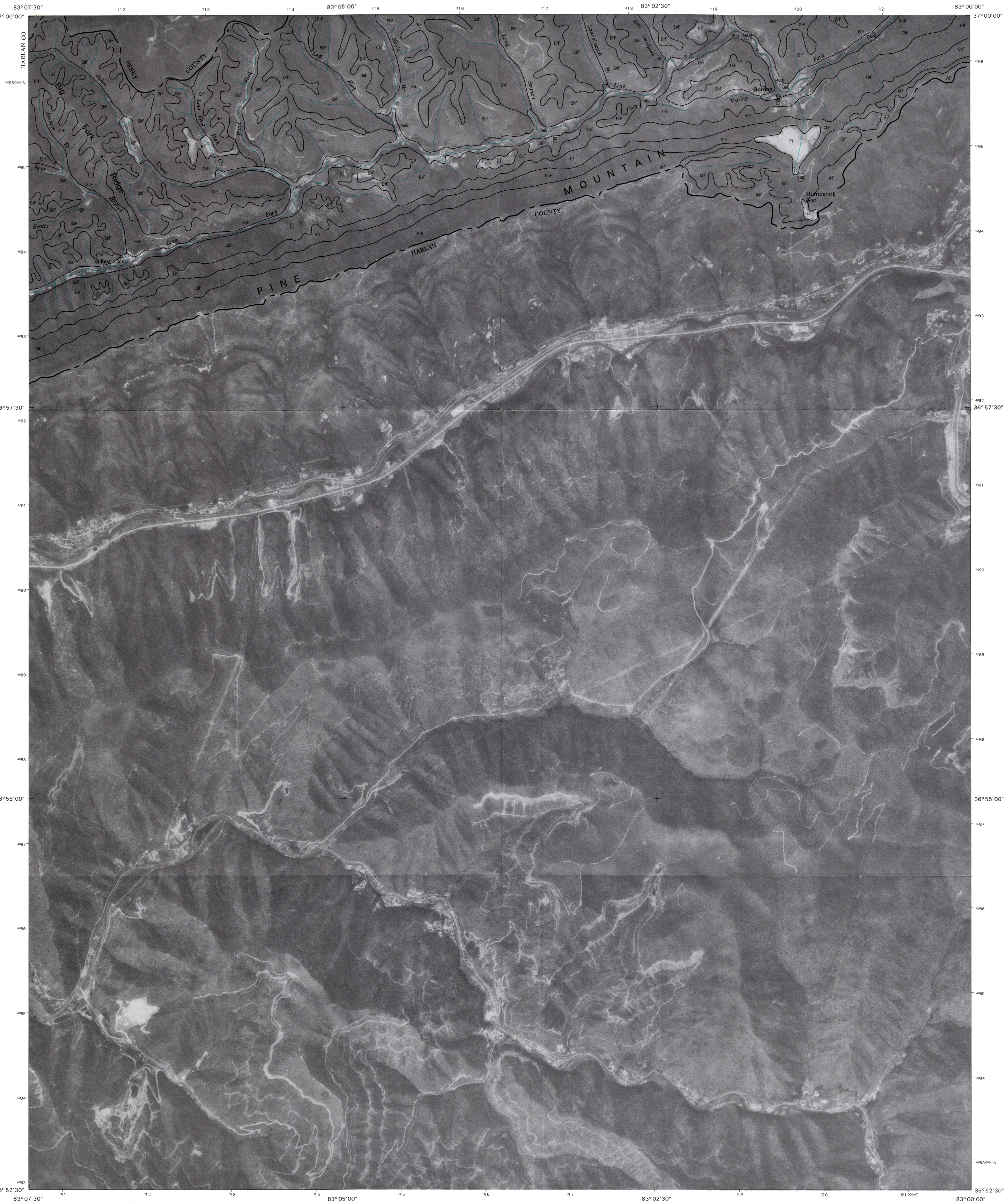
1	2	3
4		5
6	7	8

1 CUTSHIN
2 LEATHERWOOD
3 TILFORD
4 BLEDSOE
5 LOUELLEN
6 HARLAN
7 EVARTS
8 PENNINGTON GAP

INDEX TO ADJOINING 7.5 MAPS

NOLANSBURG, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 22 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 17.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

LOUELLEN, KENTUCKY

7.5 MINUTE SERIES
SHEET NUMBER 23 OF 25

1	2	3
4		5
6	7	8

1 LEATHERWOOD
2 TILFORD
3 ROXANA
4 NOLANSBURG
5 BENHAM
6 EVARTS
7 PENNINGTON GAP
8 KEOKEE

INDEX TO ADJOINING 7.5 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 TILFORD
2 POXANA
3 WHITESBURG
4 LOUELLEN
5 APPALACHIA
6 PENNINGTON GAP
7 KEOKEE
8 BIG STONE GAP

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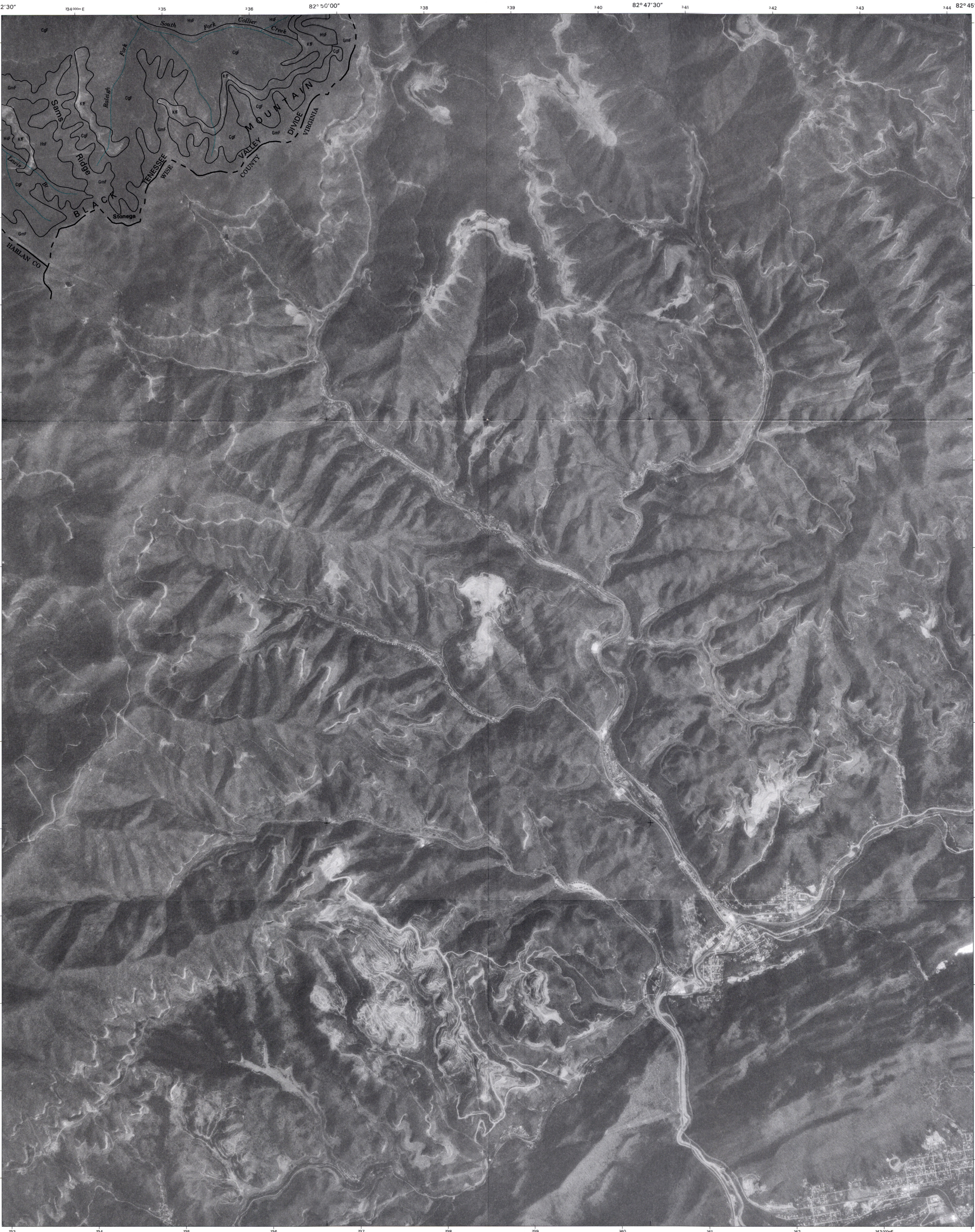
BENHAM, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 24 OF 25

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1983-1985 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery. Soils data were obtained from SSURGO.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 ½ 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETERS

QUADRANGLE LOCATION

1	2	3	1 ROXANA
			2 WHITESBURG
4		5	3 FLAT GAP
			4 BENHAM
6	7	8	5 NORTON
			6 KEOKEE
			7 BIG STONE GAP
			8 EAST STONE GAP

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APPALACHIA, KENTUCKY

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